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# CONTENTS


Page

1. *The Prabhās-Pāṭan Copperplate* .. .. 75
   By Shri S. K. Bhowmik

2. *Note on S. K. Bhowmik's Views on the Prabhās-Pāṭan Copperplate* .. .. .. .. 79
   By Dr. D. C. Sircar

3. *The Migration of Sanskrit Grammar, Lexicography, Prosody and Rhetoric to Indonesia* .. .. 81
   By Professor H. B. Sarkar

4. *Some References to Animal Hunting in Ancient Sanskrit Literature* .. .. .. .. 101
   By Dr. Aparna Chattopadhyay

5. *Some Post-Muslim Temples and Sculptures of Rājasthān* .. .. .. .. 105
   By Shri Adris Banerji

6. *Reflections of Ancient Indian Society in the Kathāsarit-sāgara* .. .. .. .. 111
   By Dr. Aparna Chattopadhyay

7. *Contributions to Our Knowledge of Indian Freshwater Plants. 5. On the Morphology, Reproduction and Autecology of* Pistia stratiotes *Linn.* .. .. 115
   By Dr. Eva Mitra


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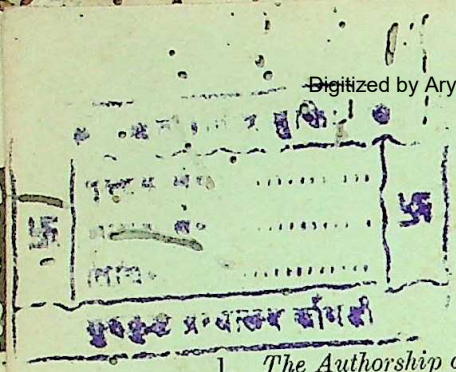

# CONTENTS


| | | Page |
|---|---|---|
| 1. | *The Authorship of Sūrjanacaritam* .. .. By Dr. R. C. Majumdar | 137 |
| 2. | *The Old Temple at Lamba and Kāmeśvara Temple at Auwa* .. .. .. .. By Sri M. A. Dhaky | 141 |
| 3. | *Clay Figurines of the Muslim Period* .. .. By Sri Adris Banerji | 149 |
| 4. | *The Ledger of the Merchant Hovhannes Joughayetsi* .. By Sri Levon Khachikian | 153 |
| 5. | *Reviews of Books* | |
| | (a) *A Bibliography of Indology. Vol. III. Bengali Language and Literature, Pt. I* .. .. By Professor Chintaharan Chakravarti | 187 |
| | (b) *The Changeable and the Unchangeable in Religion* By Sri Hiranmay Banerjee | 187 |
| | (c) *Sāṁkhyadarśana* .. .. .. By Sri Hiranmay Banerjee | 189 |


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*Journal of the Asiatic Society.*
*Vol. VIII, No. 2, 1966.*

# THE PRABHĀS-PĀṬAN COPPERPLATE

By Swarana Kamal Bhowmik

(*Received January 5, 1967*)

Twenty years ago, a photograph of a plate bearing inscriptions was published in the *Times of India*.[1] The inscription on the plate created curiosity as well as confusion amongst the scholars. Many epigraphists attempted to throw light on the inscription. Opinions were sharply diverse as to the content, antiquity and origin of the plate. When observed from the top it appears like the ancient Brāhmī script[2] written from left to right. On reverting it, however, it appears to be some Semitic script like Aramaic,[3] reading from right to left.

The plate (7·6 cm.×6·3 cm.×1·5 mm.) was discovered at Prabhās-Pāṭan in Somnath. Pandit Harishankar Shastri, President of the Prabhās-Pāṭan Historical Association, recovered the plate from a Brāhmaṇa family.

Up till now nobody is certain about the content and the place of production of the plate. As it is very difficult to know these facts in the face of extremely diverse opinions concerning the copperplate inscription, a technological study remains the only means that can provide an answer.

A quantitative chemical analysis of the plate was carried out in the Baroda Museum conservation laboratory and the data thus obtained were compared with available published data of copper objects belonging to India, Mesopotamia, Persia, Baluchistan, Anatolia and Cyprus. This comparison was necessary to trace the place of its production and the source whence the ore was obtained.

The quantitative chemical analysis of the copperplate reveals that copper is present to the extent of 98 per cent and nickel 2 per cent. The metal is found surprisingly free from impurities.

The copper objects, belonging to the Bronze Age found at Nal, Nundara in Baluchistan and Ghazishah in Sind, possess nickel (more than 4 per cent), lead (more than 2 per cent) and a little amount of arsenic in the composition.[4] It is thus clear that the present copperplate bears no relation with the Baluchistan and Sind copper as far as the composition is concerned. The copper objects found in the Indus Valley are marked by the presence of antimony and iron as impurity in very little percentage; but the percentage of arsenic is appreciable and, in some objects, the arsenic content rises to seven per cent. The Indus Valley copper objects contain a very little percentage of nickel usually below 0·5 per cent and seldom above 1·06 per cent.[5] But the present copperplate is free from impurities which are present in the Indus Valley copper.[6] The analytical data of the copper objects found at Rangpur, a Harappan site in Gujarat, also disagree with the copperplate's composition. The Rangpur copper contains nickel, iron, tin and lead and the percentage of nickel hardly goes beyond 0·88 per cent.[7]

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[1] *Times of India*, Bombay, Friday, March 1, 1935, p. 12.
[2] Dani, *Indian Palaeography*.
[3] Raj Bali Pande, *Indian Palaeography*.
[4] Stuart Piggot, *Prehistoric India*, p. 90.
[5] P. C. Ray, *History of Chemistry in Ancient and Mediaeval India*, p. 25, Table III.
[6] R. E. M. Wheeler in *Ancient India*, No. 3, January 1947, p. 125.
[7] B. B. Lal. 'Scientific Examination of Metal Objects from Rangpur' in *Ancient India*, Nos. 18 and 19, 1962-63, p. 152.



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A comparison of the published analytical data of a number of chalcolithic copper objects discovered from Chandoli (Maharashtra), Ahar (Rajasthan) and Langhanaj (Gujarat) shows further disagreement with the present copperplate.[1] The composition of the Nalanda copper objects also differs remarkably from that of the present copperplate.[2] From the above considerations and observations, it is obvious that the copper of the present copperplate does not belong to Indian soil and its origin, therefore, must be outside India.

A comparative study of the analytical data of the Bronze Age copper objects obtained from Ur, Kish, Tell-el-Obeid, Iraq and the Islands of Bahrein has enlightened us further. One copper object from mound A at Kish contains nickel to the extent of 3·34 per cent, copper 94·0 per cent, tin 0·43 per cent, lead 0·58 per cent, iron 1·31 per cent, sulphur 0·17 per cent. The copper objects from Tell-el-Obeid contains copper 98·81 per cent, nickel 0·12 per cent, iron 0·98 per cent. But the copper nail from Iraq is conspicuous by the absence of nickel. Out of the five bronze specimens from the Islands of Bahrein, three contain no nickel, the other two having nickel to the extent of 0·27 to 0·52 per cent. A copper nail, attached to a Sumerian statuette of elaeolite, in the Ny-carlsberg Glypotothek at Copenhagen, was analysed by Professor John Sabelian and shows that copper is present to the extent of 95·07 per cent, nickel 0·28 per cent and iron 0·86 per cent.[3] Three specimens from the earliest graves at Ur, dating from before the first dynasty of that city, was analysed by Professor Dr. Cecil Desch, who found the percentage of copper varying from 84·18 to 85·13, tin 11·78 to 14·52, lead 0·47 to 1·62 and nickel 2·20, iron being present in one object to the extent of 1·74 per cent.[4]

Professor Bannister analysed one copper tool discovered from the Protodynastic Tomb (1207), and found the metal to be of high purity, though the nickel content of this tool was unusually high.[5] Thus the presence of impurities such as lead, tin, iron and nickel indicates palpable difference between the Ur copper and the copperplate under discussion. But the analytical data of an axe-head made of copper obtained from the lowest layer at Susa near the head of the Persian Gulf are very interesting. This Susa axe-head was made of highly pure copper with little nickel, all other impurities being notably absent.[6] Another copper article from Susa was a horse-harness which was analysed and found to have copper content to the extent of 98·5 per cent with a little nickel and iron.[7] This gives another instance of high purity of the Susian copper object. It is, therefore, not unreasonable to think that the composition of the copper axe-head as well as the copper horse-harness bears a close similarity with that of the copperplate under discussion. From the above facts it may be observed

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[1] K. T. M. Hedge, 'Metallographic studies in Chalcolithic Objects' in *Journal of the Oriental Institute*, M.S. University of Baroda.

[2] B. B. Lal, 'Examination on Some Metal Images from Nalanda' in *Ancient India*, No. 12, 1956, p. 56.

[3] Harold Peake, 'The Copper Mountain of Magan' in *Antiquity*, 1928; Desch, 'Reports of the Committee on Sumerian Copper' in *Annual Reports of the British Association for the Advancement of Science*, 1928 to 1936; John Salelian, 'Analysis of a Copper Nail' in *Ancient Egypt*, 1924, p. 12.

[4] Harold Peake, 'The Copper Mountain of Magan' in *Antiquity*, 1928, p. 454.

[5] H. H. Coghlan, 'Notes on the Prehistoric Metallurgy of Copper and Bronze in the Old World', Pittrivers Museum, University of Oxford, p. 31.

[6] Harold Peake, 'The Copper Mountain of Magan' in *Antiquity*, 1928, p. 453.

[7] R. de Mecquenem, 'The use of Metals by the Susanehite civilizations', *Metaux et Civil*, 1 (1946), pp. 77–88; *J. Inst. Metals, Metallurgical Abstracts*, Vol. 14, 1947, p. 145.



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that the Sumerians utilized an ore containing impurities such as iron, tin and lead with an indefinite percentage of nickel, while the people of Susa used an ore free from impurities but with an appreciable quantity of nickel. It cannot be ignored that the Susian method of purification of the ore was much more advanced than the method used by the Sumerians.

In view of the above analytical data, we may draw a tentative conclusion that the copperplate under investigation belongs to Susa in Elam (Persia) near the head of the Persian Gulf. This conclusion also supports Shri Viccaji Dinshaw's opinion[1] of the Persian origin of the copperplate. The present copperplate does not appear to be a copperplate grant or any important document. It is a kind of talisman and such talismanic plates, square or round, were popular and widely used in Persia and other countries of the Near East for warding off the effects of the evil eye, a malady and a calamity.

A micro-metallographical examination proved that the metal is sound, compact and homogeneous, and free from cracks and porosity. The internal structure of the metal is fine and free from gas holes; the casting appears to be of good quality. Only the presence of a very small quantity of cuprous oxide in the metal was noted. The metal is totally free from corrosion products. The polished surface of the copperplate revealed its bright characteristic copper colour. This soundness of casting in copper, which is not too easy a metal to deal with, is a proof of skill of the metal worker. Another important point worth mentioning is that nickel is not the usual impurity in copper. The presence of nickel in reasonable quantity is advantageous. For it increases the hardness, but does not render the metal brittle and, at the same time, improves upon the casting properties. This indicates that the artisan who made this copperplate was in the know of the necessary skill and technical knowledge of sound casting. And, amongst the earliest metallurgists, the Susians alone can claim that perfection in metal work. The Susians and their neighbours, the Sumerians, showed an amazing technical skill in the products of metal workers; but, as far as the use of copper is concerned, the Susians showed greater skill than the Sumerians. Archaeological evidences revealed the fact that the metal workers of Susa attained great technical achievements in the making of metal articles from very early times.[2] The excavated metallic specimens from Susa such as vases, plates, mirrors, weapons and ornaments made of copper have been dated from 2800 to 2500 B.C. In Susa, articles of gold and silver belonging to about 2300 to 2200 B.C. were unearthed. Lead appears to have been used in Susa at the same date as gold and silver with a purity of 99·8 per cent. At about 1000 B.C., iron appeared in Susa in the form of arrow-heads and the ring was of high purity. All these indicate that the technical achievements of the metal workers of Susa were more commendable than that of the Sumerians. As Susa suffered sieges and pillages many times, the high technical knowledge of the metal workers of Susa rapidly spread to their neighbouring countries.

From the analytical data, it may also be suggested that it is very likely that the Susian coppersmith who prepared the copperplate obtained such pure copper by smelting malachite which is often of high purity. According to the German metallurgist, Wilhelm Witter, any copper obtained by smelting even when obtained from the purest oxidized ores, such as

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[1] *Times of India*, Bombay, Wednesday, April 17, 1935.

[2] R. de Mecquenem, 'The use of Metals by the Susanehite civilizations', *Metaux et Civil*, 1 (1946), pp. 77–88; *J. Inst. Metals, Metallurgical Abstracts*, Vol. 14, 1947, p. 145.

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malachite, azurite or a mixture of both, must contain traces or small quantities of foreign metals which may help to trace the source of the ore. Studying the analytical data of the ores obtained from different sites of Mesopotamia, Persia and other places, an attempt may be made to determine the place or source of the ore used in the making of the copperplate. The analytical data of the sample of copper ores obtained from Anatolia, Persia, Cyprus and the Sinaitic Peninsula, published by Professor Dr. Cecil Desch of the Sheffield University, proved the absence of nickel in all the samples of the above-mentioned places. The ore found in Oman was also analysed by Professor Desch and revealed interesting data. The ore, which was in the form of thin veins much mixed with other minerals, contained 1·50 per cent copper and 0·19 per cent of nickel. Thus it may be suggested that the people of Susa obtained their supply of copper from the mountain of Oman which yields an ore with a perceptible nickel content. Oman is situated on the south-west side of the Persian Gulf. The people of Susa and the neighbouring Sumer probably had knowledge of Oman where copper ore was available. According to Professor Langdon, 'Magan' was called the mountain of copper, and he suggests that this refers to Jabel Akhdar in Oman where copper is still found.

It may, therefore, be argued that the plate under investigation is made of copper drawn from the Oman (Magan District) which is situated on the south-west side of the Persian Gulf; and it was manufactured by the people of Susa.

As regards the date of the plate, nothing can be said for certain. From the technological point, the possible place of its production directs more towards Susa than to Sumer. But technologically speaking, the date of the plate should be earlier than eighth century A.D. which has been suggested by Shri Viccaji Dinshaw by his epigraphic study.

As far as the occurrence of the plate in the soil of Prabhās-Pāṭan is concerned, one may surmise that the plate has been brought to India from Susa by some people who had come to settle in India or for trade. There are evidences in history in support of migration and of trade relations between the two countries from the hoary past which cannot be ignored.

## Acknowledgements

The author's grateful thanks are due to Shri M. A. Dhanki of Government Archaeology Department of Gujarat, Rajkot, and Shri H. P. Sastri of Prabhās-Pāṭan for their kind co-operation and for sending the copperplate to us for a technological study.

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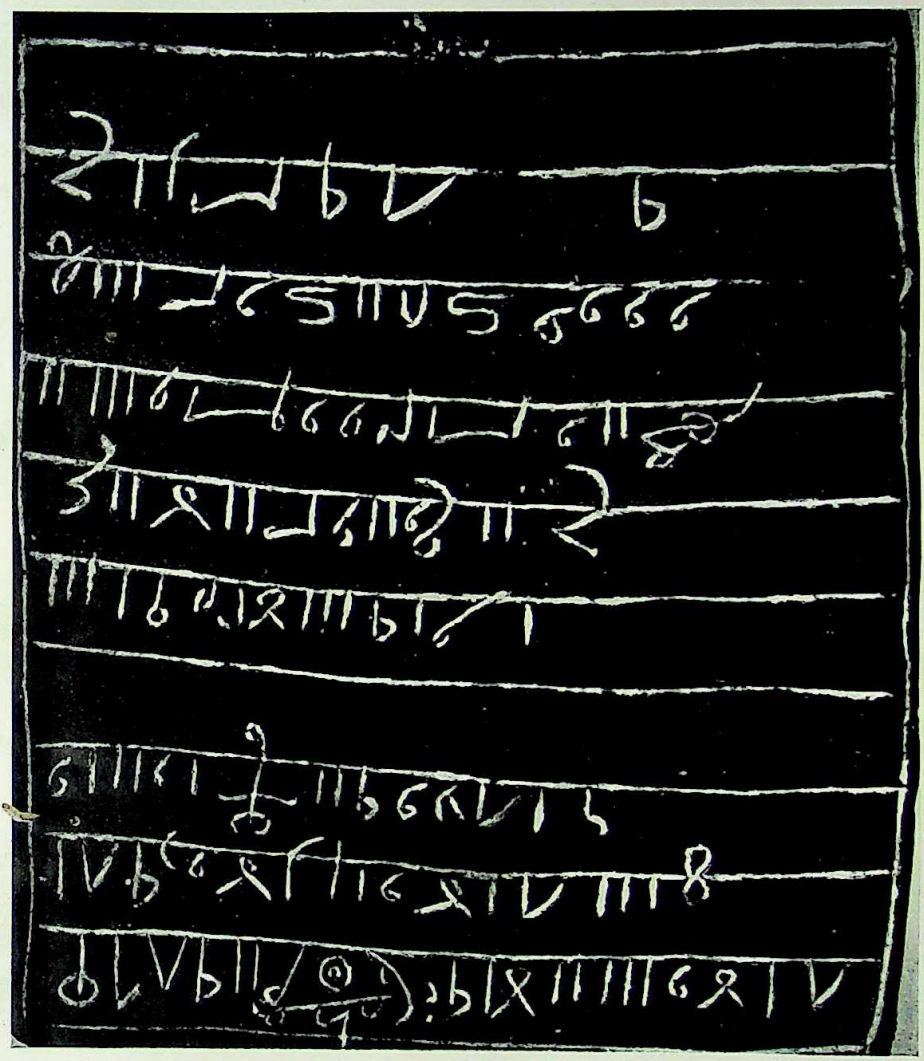

Facsimile of the Prabhās-Pāṭan Copperplate.

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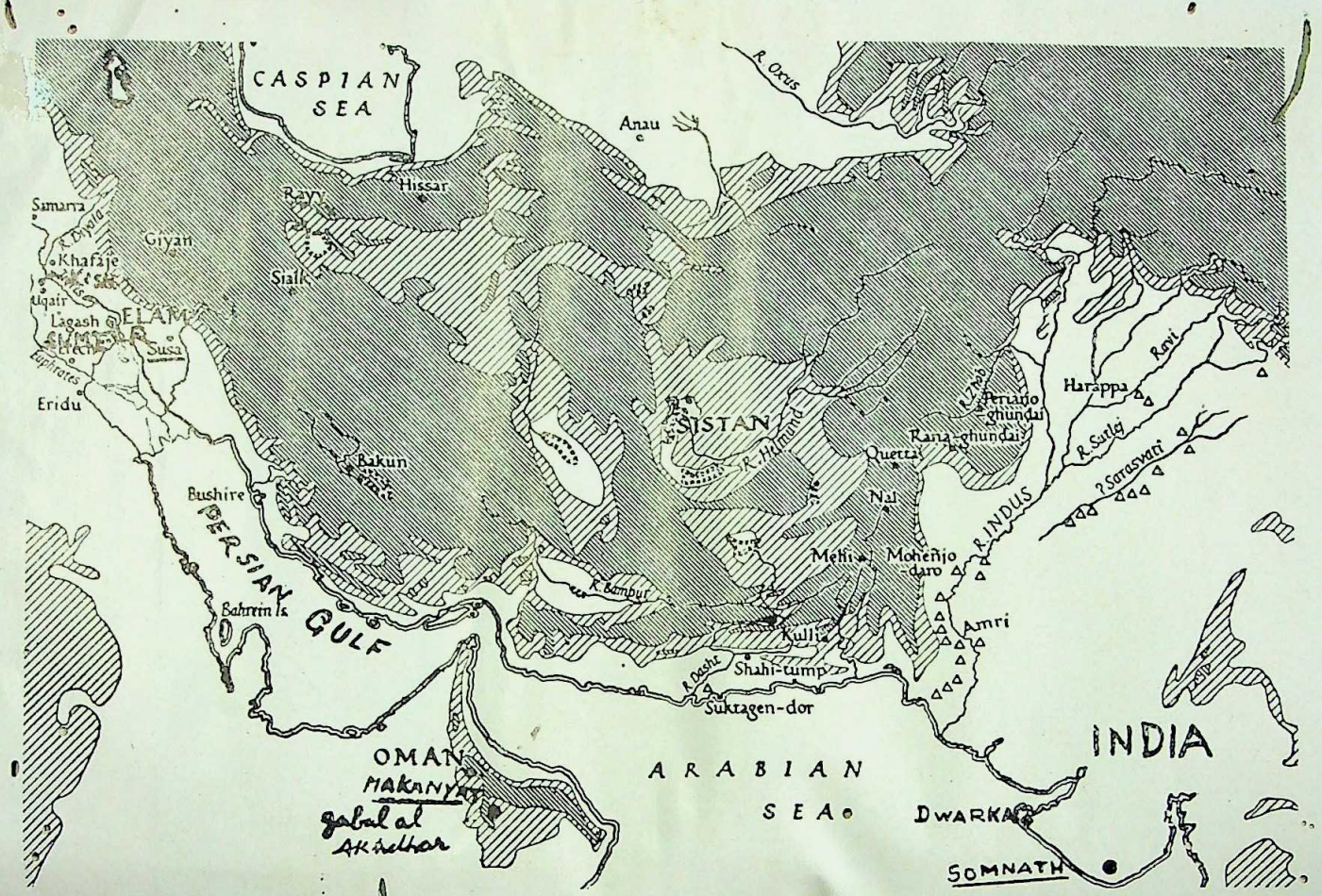


Map showing India and Western Asia.

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# NOTE ON S. K. BHOWMIK'S VIEWS ON THE PRABHĀS-PĀTAN COPPERPLATE

By D. C. Sircar

When the Asiatic Society asked my opinion on Sri Bhowmik's paper, I was happy because, in the latter half of 1965, I had an occasion to express my views on the inscription it bears. The curator of the Tablet Section, the University Museum, University of Pennsylvania, U.S.A., sent me a photograph of the inscribed plate and drew my attention to an old article on the inscription appearing in the *Times of India*, Bombay, in which the author associated it with king Nebuchadrezzar of Babylon, whose name was read in the epigraph. It is well known that Nebuchadrezzar I is assigned to *c.* 1140–1123 B.C. while the second ruler of the same name is said to have ruled in *c.* 604–562 B.C. The American scholar was puzzled because no Western savant could read the writing on the plate and thought that an Indian student of epigraphy might be of help. I was, therefore, asked to give my opinion on the question whether the name of Nebuchadrezzar actually occurs in the record.

I examined the photograph and observed that the inscription does not only contain any such old name, but is really some gibberish in the late medieval Perso-Arabic (Urdū) script and that the plate was apparently intended to be used by a Muhammadan as a *tābīz* or talisman.

Some time afterwards, in a communication to the monthly meeting of the Asiatic Society held on the 6th December, 1965, I further pointed out that such plates are called *yantra* by the Brahmanical Hindus and Jains (because they often bear diagrams called *yantra*)[1] and that they are widely used by the Indians, including the Muhammadans, for ensuring prosperity and averting evil. I also said that the writing on the plate consists of letters of the Perso-Arabic script together with some numerical figures and just a few symbols and that it was not meant for being understood by ordinary people. A holy man's writing was copied on the plate in order to make the talisman lasting; but its author wanted to give it the look of an enigma. Of course, if it would have been taken to its author or another person of the same type, he could read in it whatever he liked.

Buddhist Dhāraṇīs written on gold, silver or copperplates and on terra-cotta plaques were often used as talismans. They have been discovered in India and other Buddhist countries and have been noticed by scholars.[2] The talisman plates of the other communities are, however, sometimes ignored since they are supposed to be of little importance for the reconstruction of history. The following talisman plates have nevertheless been noticed in the *Annual Report on Indian Epigraphy* during the past few years :

I. 1953-54, No. A–6 from Tekkali in the Srikakulam District, Andhra Pradesh. Written in the Telugu language and script, it is a rectangular copperplate shaped like a *vedikā* and contains what is called the *Rājalakṣmī-yantra*.

II. 1953-54, No. C–133 from the Dacca Museum, East Pakistan. It is a copperplate bearing an inscription in Arabic and Persian in Nasta'līq

[1] Sircar, *Indian Epigraphy*, p. 77.
[2] Cf. *ibid.*, pp. 73, 78, notes 1 and 3.



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Map showing India and Western Asia.

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characters, which contains the *Nād-i-'Alī* and the names of the archangels and was made for the use of Ḥasan Khān and his family for averting calamity.

III. 1955-56, No. A–8 from Mandasa in the Srikakulam District, Andhra Pradesh. Written in Sanskrit in late Nāgarī characters, this copperplate (nearly two feet square) bears the representation of a diagram consisting of 13 concentric circles with a number of lotus petals, the interspaces between the petals containing adoration to several Brahmanical deities and the spaces inside the petals certain Vaiṣṇavite *bījas*.

IV. 1959-60, No. A–52 from the Rājwāḍe Saṁśodhak Maṇḍal, Dhulia, Maharashtra. This copperplate bears the following enigmatic inscription in Nāgarī characters in two lines:

1. *ba° go° ka°*
2. *ba de rā° tā nā.*

V. 1960-61, No. A–26 from Ootacamund in the Nilgiris District, Madras. This plate bears a Sanskrit stanza in Grantha characters in praise of the god Āñjaneya whose figure is engraved above the writing.

The above five specimens of talisman copperplates would give the reader some idea about the varied nature of their contents. No. IV shows that the inscription was sometimes enigmatic as in the case of the Prabhās-Pāṭan plate.

Bhowmik has studied the metal of the plate, which is copper of high purity, and not the inscription it bears. However, his study is quite interesting because it relates to the problems created by some pseudo-epigraphists on the basis of the writing. On an analysis of the metallic content of the present plate and other copper antiquities from ancient Indian and West Asian sites, Bhowmik comes to the following conclusions: (1) The plate came to India from Susa in Elam (Persia) near the head of the Persian Gulf; (2) it is a talisman and such plates were widely used in Persia and other countries of the Near East; (3) its copper was drawn from Oman (Magan District) to the south-west of the Persian Gulf; and (4) its date is earlier than the eighth century A.D.

He is certainly right in regarding the plate as a talisman. It is unfortunate, however, that he does not explain as to why it should be ascribed to a date earlier than the eighth century A.D. Is it because a plate of pure copper could not have been made in India, even for a special religious purpose, during the Medieval Age? But the Perso-Arabic characters appear to be far too late for a date before the late medieval period. Of course, one may say that the plate was made during the late Medieval Age out of a copper object originally brought to India from the Persian Gulf area at a much earlier date.

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# THE MIGRATION OF SANSKRIT GRAMMAR, LEXICOGRAPHY, PROSODY AND RHETORIC TO INDONESIA

By Himansu Bhusan Sarkar

(Communicated by Professor Suniti Kumar Chatterji)

(*Received December 8, 1966*)

In an interesting paper read before the Asiatic Society,[1] Prof. Amulyadhan Mukhopadhyaya drew our attention to some aspects of Sanskrit metres and pointed out their similarity with Homeric and Old-Iranian metres. Our views about Indo-Aryan culture have rightly been formulated in the context of Ur Indo-European culture, with which the Indo-Aryan culture is associated in diverse ways. It was, therefore, not inappropriate that Prof. Mukhopadhyaya should invite our attention to the Indo-European and Indo-Iranian phase of our culture, particularly in the domain of metrics. The purpose of the present paper is not so much to do a piece of research work as to invite the attention of Indian Sanskritists to another important aspect of this culture and summarize the results of investigations so far done by European and other scholars, mainly Dutch, in this field. In view of the vast extent of the subject, the number of workers in the field has appeared to be exceedingly meagre and the output of investigations has been rather small, though not unimportant. This virgin field for work refers to Indo-Javanese grammatika, lexicography, prosody and rhetoric, not to speak of other branches equally interesting. Some spade-work has no doubt been done by European and Indonesian scholars, but the results of their studies are limited to those who know the Dutch and the German languages. No apology is, therefore, needed to present the subject-matter to scholars unacquainted with these languages.

Before we discuss the subject proper, it is perhaps necessary to make some observations on Indo-Javanese language and literature in so far as it relates to this paper. Of the hundreds of languages of the Malaya-Indonesian world only Javanese has an old literature of its own, dating perhaps from the ninth century A.D., though extant literary works with definite dates do not go beyond A.D. 996. The classical period of this literature spanned about five hundred years and then made room for Middle-Javanese. The Old-Javanese language was called Kavi even in the Majapahit period, because we come across in the *Nāgarakṛtāgama* (25 : 2) composed in A.D. 1365 the expression *vidagdeng āgama vruḥ kavī*, i.e. he was proficient in the *āgama*-lore and knew the *kavi*-language. The term *kavi* is now taken to mean traditional literary idioms in general, whether it is written in Old-Javanese or in a later form. The works in *kavi*-poesy are designated *kakavin* and they are composed in about a hundred Sanskrit metres. From references in older literature it appears that there were other literary devices—I do not think there are adequate data to give such literary devices the honour of the designation of 'literary genre'—and one such device, perhaps in Sanskrit language, was called *vavacan*, which has been referred to in the *Nāgarakṛtāgama* (93 : 2). It is not clear if it

[1] On 7th November, 1966, with Dr. R. C. Majumdar in the chair.



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was composed in native metres and looked like the Malay Pontoons. Another class of poetical composition, probably in Sanskrit metre, was called *lambang*, which has been referred to in the *Sutasoma*, an Old-Javanese work dating from the fourteenth century A.D. Here the author speaks, towards the end of the poem, of 'the poet of songs and lambangs'.[1] These must have been popular in Java in the fourteenth century, because the *Nāgarakṛtāgama* also speaks of them.

Old-Javanese literature took shape in Central Java, but it flowered into wonderful shape in the court of the East-Javanese kings. Sanskrit language and literature crashgated into this empire of Indonesian languages, as they had nothing in common. The Indonesian languages are mono- or disyllabic, but they have no genders, case, number and inflexions, as in Sanskrit, nor do they form compound words or samāsas, though Sanskrit *sandhi*-rules have been followed here and there, but very grudgingly. Under these special circumstances, the influence of Sanskrit was necessarily limited: its contribution mainly lay in the sphere of loan-words, rhetoric and prosody. Besides, Sanskrit authors have given the Indonesian writers the theme of their works, but structurally the two languages belong to two different worlds. In the following lines we shall discuss how Sanskrit grammars, lexicography, rhetoric and prosody contributed their quota to the evolution of Old-Javanese literature. Naturally, the present study is designed to indicate the lines where competent Sanskrit scholarship from this country can be fruitfully employed. I now propose to discuss the subject under two broad headings, viz. (*a*) Grammars and Lexicographies and (*b*) Prosody and Rhetoric.

## (*a*) Grammars and Lexicographies

Fortunately for us, some Indo-Javanese grammars and lexicographies have reached our hands. From the nature of the case, these works must have been composed early, but it is difficult to assign any particular date to these works, though the origin of some of them in Central Java is not, prima facie, an absurd proposition. Of these works, the *Svaravyañjana*,[2] the *Ādisvara*,[3] the *Kṛtabasa*,[4] the *Sukṣabasa*[5] and the *Kārakasaṃgraha*[6] were meant for practical exercises in translation from one language to another. The reference to Pāṇini, Kātantra and *Candravyākaraṇa* in Old-Javanese literature/inscriptions perhaps indicates the line of Sanskrit grammatical tradition of Indonesia. We may study this tradition by a discussion on the *Candravyākaraṇa*, not only because it comes from the unimpeachable source of an Old-Javanese inscription of a known date, but also because it clearly states that some high officials of the State were proficient in it. The study of grammar was an essential qualification of high functionaries. Indeed, in an inscription of Jaya-Söng, dated *c.* A.D. 1350,[7] it has been stated that *ḍang ācārya* Śivanātha and some others

[1] *Vide* Brandes, *Pararaton*, p. 163; *Nāgarakṛtāgama*, 94: 3–4; Pigeaud, *Java in the Fourteenth Century*, IV, p. 336.

[2] Juynboll, *Supplement*, II, pp. 216 ff,; *BKI*, 6th series, VII, pp. 630 ff.; H. B. Sarkar, *Indian Influences*, pp. 107 ff. A text of this name has been published by the International Academy of Indian Culture, New Delhi, 1956, but in a form which renders it difficult for scholars to use it.

[3] Juynboll, *op. cit.*, p. 205 cod. 4009.

[4] *Ibid.*, p. 207; *BKI*, 3rd series, VI, 1872, pp. 80-81, and Gonda, *Sanskrit in Indonesia* (1952), pp. 106-7.

[5] Juynboll, *op. cit.*, p. 216.

[6] S. Levi, *Sanskrit Texts from Bali* (GOS, No. 67), 1933, pp. xxxi and 87, and Juynboll, *op. cit.*, p. 215, No. 5075.

[7] Pigeaud, *op. cit.*, I, pp. 104–7 (text); III, pp. 151–55 (trans.).

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were versed in 'nyāyavyākaraṇaśāstra'. These descriptions do not appear to me to be ornamental ones, because while *ḍang ācārya* Kanakamuni has been described as *boddhaśāstravyākaraṇa parisamāpta*, *ḍang ācārya* Jayasmara has been described as *śangkyaśāstra parisamāpta* (*śangkya* = Sāṃkhya philosophy). In the Ferry-Charter of A.D. 1358,[1] such qualifications have been attached to the names of high officials. The precise name of a Sanskrit grammar from India has been found in an inscription of Java. It refers to the copperplates of Sĕkar, Bajanĕgara; the text of the inscription was published[2] by Prof. Krom long ago. In plate 3, ll. 5–6 of this record (second face) we come across the following interesting statement: *dharmmādhyakṣa ring kasogatan ḍang ācārya nādendra sang āryyādhirāja boddhapakṣa tārkkacandravyākaraṇa parisamāpta . . .*, i.e. the superintendent of the Buddhist institutions (viz.) *ḍang ācārya Nādendra* (called) Āryyādhirāja who belonged to the sect of the Buddhists and had finished the (lore of the) sceptical science and the grammar of Candra. The record under review was composed after A.D. 1365. Whether this Buddhist Nādendra or Nādajña be identified with Prapañca, the writer of the *Nāgarakṛtāgama*, as proposed by Krom,[3] or be his father, and son of Kanakamuni, as proposed by Poerbatjaraka,[4] he was doubtless an important person and has been referred to in other inscriptions as well[5] and undoubtedly flourished in the second half of the fourteenth century A.D.

The *Cāndravyākaraṇa*, as referred to in the Old-Javanese inscription, was written by the Buddhist scholar Candragomin. The work is closely connected with the *Aṣṭādhyāyī* of Pāṇini, but has also some original portions in it. B. Liebich who has recovered and edited the *Cāndravyākaraṇa* (*sūtra*, *uṇādi* and *dhātupāṭha* as well as its *vṛtti*) is of opinion that Candra wrote both the text and the commentary and that he flourished probably in the period between A.D. 465 and 544, though some others are inclined to place the date still later. The work is certainly earlier than the *Kāśikā* of Jayāditya and Vāmana, for this commentary on Pāṇini appropriates without acknowledgement 35 original *sūtras* of Candra's grammar, which had no parallel in Pāṇini but which Kayyata distinctly repudiates as un-Pāṇinian.[6] The *Cāndravyākaraṇa* does not offer any material divergence from the work of Pāṇini (except 35 rules mentioned above), though it recasts the rules of Pāṇini and, in that respect, it may be considered to be an improvement upon the latter. As against the eight chapters of Pāṇini, it has six chapters of four sections each, the subject-matter of Pāṇini's first two chapters being distributed over the whole work. It rearranges the rules, sometimes simplifies the wording, reduces and modifies the *pratyāhāras*, makes certain changes in terminology, distributes the *saṃjñās* and omits the Vedic rules. It is interesting to observe that the *dhātupāṭha* of the Kātantra is in reality that of the Cāndra-system as modified by Durgasiṃha. From this point of view, the mention of the names of Pāṇini-Kātantra-Candra in the records of ancient Java appears to be significant and indicative of tradition of Sanskrit grammar as introduced in Java. It is, therefore, permissible to conjecture that the Old-Javanese tracts to teach Sanskrit were mainly, if not solely, based upon the *Cāndravyākaraṇa*.

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[1] Pigeaud, I, pp. 108–12 (text), III, pp. 156–62 (trans.).
[2] *TBG*, 53, pp. 433-34.
[3] *Ibid.*, 57 (1916), p. 30.
[4] *BKI*, 78, pp. 442–59.
[5] *See* Kern, *VG*, VII, pp. 187 ff.; *OV*, 1918, Bijl. K., etc.
[6] *Vide* Kielhorn in *Indian Antiquary*, 1886, pp. 183-85; Liebich, *Konkordanz Panini-Candra*, Breslau, 1928.

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The names of Pāṇini, Kātantra and Vararuci (*Vararuci ālia*) occur in the Old-Javanese grammatical work known as *Kārakasaṃgraha*. The *versus memorialis* in which the name of Pāṇini occurs runs as follows:

Dviguḥ tatpuruṣo dvando karmadhāraya tathaiva ca,
váhuvrīhyāmavyayībhāvaḥ samāsaḥ pāṇinestu ṣaṭ.

The śloka has been corrupted and the metre is also faulty. Its original was probably something like this:

Dvigustatpuruṣo'hdvandvastathā ca karmadhārayaḥ
vahuvrīhyāvyayībhāvau samāsāḥ pāṇinestu ṣaṭ.

Be that as it may, the above-mentioned *versus memorialis* might have reached Indonesia as a traditional lore without the actual work ever being present in this place.[1] It is, however, worthy of note that King Indravarman III of Campā is said to have attained considerable proficiency in the grammar of Pāṇini with its *Kāśikā* and *Ākhyāna*, and had special knowledge of the *Uttarakalpa* of the Jainas.[2]

The *Kārakasaṃgraha* has been found in two MSS. and the name of the work has been recorded at the end. In this work, the writer has explained the *kārakas* one by one. It begins by stating that the person who knows the connexions between *karman* and *kartṛ* may be called an expert. The text, as published by S. Levi, has about 45 ślokas. It includes, among other things, the following:

Karmakartā tayoryogaṃ vetti sa vicakṣaṇaḥ |
yat kṛtaṃ karmma tat proktaṃ sa kartā yaḥ karoti vā ||
tṛtīyā prathamā ṣaṣṭhī tisraḥ kartṛtvajātayaḥ |
pañcamī saptamī tābhyāṃ ṛte tat karmma śabdyate ||
sadvitīyā tṛtīyā ca pañcamī ṣaṣṭhikā tathā |
vibhaktayaścatasrastāḥ karaṇaṃ saṃprakāśitāḥ ||
tṛtīyakā caturthī ca ṣaṣṭhī tisro vibhaktayaḥ |
sampradāne samuddiṣṭāstapādāne pi pañcamī ||
vibhaktī dvo'hdhikaraṇaṃ ṣaṣṭhikā saptamī tathā |
tatsarvvaṃ yuktitaścintyaṃ śeṣe ṣaṣṭhī tu manyate ||

Towards the end of the text we read:

Kātantraṃ ca mahātantraṃ dṛṣṭvā tena uvāca |
vālāvavodha(nā)rthāya kṛtaḥ kārakasaṃgrahaḥ ||

S. Levi has stated that the definitions of the *kārakas*, as given by the author, very nearly approaches that of the *Kātantra* of Sarvavarman (beginning with 2/4, 14).[3] The Sanskrit original of the text has not been discovered, but the author has stated that he has utilized the *Kātantra* and the *Mahātantra*. The Balinese commentator has further stated that the word *vakābhyām* occurring in the second pāda of the first śloka refers to Viṣṇu and Brahmā and that the epithet *kavīndra* used in the subsequent śloka refers to Pāṇini.[4]

The ślokas of the *Kārakasaṃgraha* have been explained in the native language. The MSS. utilized by S. Levi were elucidated in Balinese. It appears that tracts of this type were designed to facilitate the translation from Sanskrit into Javanese or Balinese, as the case may be, by Indonesian students. Some fragmentary texts of this nature have been found in

[1] H. B. Sarkar, *op. cit.*, pp. 110 ff.
[2] R. C. Majumdar, *Champa*, 1927, p. 232.
[3] Levi, *op. cit.*, p. xxx.
[4] *Ibid.*

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Bali, and we can deduce from them the method applied by the writers for the teaching of Sanskrit. We can offer some excerpts from such a fragment:[1]

'Sah: aham . . . tam rāmalakṣmaṇau rāmasca lakṣmaṇaśca rāmaḥ . . . lakṣmaṇa . . . sitāsitau sitaśca asitaśca sitaḥ asitaḥ . . . bhrātarau . . . vicarantau . . . tat[2] vanam . . . tasmin vane . . . Sītā janakātmajā janakasyātmajā janakaḥ . . . ātmajā . . . tam rāmalakṣmaṇau sitāsitau bhrātarau vicarantau tāṃ sītāṃ janakātmajāṃ namaskṛtvā saḥ aham tat rāmāyaṃ rāmasya ayanaṃ rāmaḥ . . . ayanaṃ', etc.

This extract is an exercise based on the first two ślokas of an epitome of the *Rāmāyaṇa* and runs as follows:

'Rāmalakṣmaṇau bhrātarau namaskṛtyā sitāsitau
vane tasmin vicarantau sītām ca janakātmajām.'[3]

This abridged *Rāmāyaṇa* is called *Caritrarāmāyaṇa* or Kavi Janakī and is extant in Bali. Such tracts were obviously written to teach rules of Sanskrit Grammar or as text-books in classes. Levi has drawn our attention to the fact that Pītāmbar Śarman had composed a Sanskrit Grammar entitled *Sārasaṃgraha* on the basis of *Saṃkṣiptasāra* of Kramadīśvara. In that work, an epitome of the *Rāmāyaṇa* was worked out in metrics to teach the verbal formations in Sanskrit.[4] In the *Caritrarāmāyaṇa*[5] a similar attempt has been made to make the students familiar with Sanskrit rules of grammar. In the very beginning of the text we come across the following lines:[6]

'viṭapoccitāya viṭapena uccita viṭapaḥ . . . uccita . . . tena vṛkṣeṇa . . . parṇena viṭapoccitaśākhinā . . . te yācakāḥ saṅgapātrā . . . ākṛtyante . . . pumāṇ dātā . . . dātuṃ tacchilaḥ . . . tena puṃsā dātrā te ālayāḥ . . . hṛṣṭāḥ te ālayāḥ hṛṣṭāḥ prahayanti . . . saḥ vṛkṣaḥ . . . stavakena aḍhyaḥ . . . gandhavatya gandhaṃ vahati . . . gandhaḥ vahati . . . tasmai vṛkṣāya stavakādyāḍhyāya gandhavahine.'

We may now discuss another text dealing with Sanskrit grammar. It is called *Svaravyañjana*. The work is divided into two parts. The first part deals with svaras and vyañjanas and the second part with dhātu-rūpa and Sanskrit composition. Some sandhi-rules have also been discussed in the work. In the list of vowels, we find *a, ā, i, u, ṛ, ḷ, e, ai, o, aḥ, oṃ*. Some of the long vowels are missing from the list. Dr. Juynboll thought that the missing vowels might have been present in the original text.[7]

In the list of consonants, one misses *kha, cha, jha, ṭha* and *ḍha*, which form no part of the Javanese system of consonants: there has also been some confusion in the serial No. of *ś, ṣ* and *s*. Such desiderata may be due to the carelessness of the copyist because these letters were not unknown to Old-Javanese authors. In the *Buddhaveda*, for example, we come across the following list: 'Svaravyañjana: *a, ā, i, ī, u, ū, ṛ, ṝ, ḷ, ḹ, ka, kha, ga, gha, ṅa, pa, pha, ba, bha, ma, ya, ra, l, va, ca, cha, ja, jha, ña, śa, sa, ha, ta, tha, da, dha, na.*' In this list we miss the *ṭa, ṭha*, etc.[8] In the *Vedaparikrama-sārasaṃhitākiraṇa*,[9] we find, in addition to the vowels described above,

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[1] Text in Levi, *op. cit.*; Gonda, *op. cit.*, p. 106.
[2] For printing or for other reasons, the text from this portion up to vicarantau has been omitted in the extract furnished by Gonda, *op. cit.*
[3] Text in Levi, *op. cit.*, p. 89; Gonda, *op. cit.*, p. 106.
[4] Levi, *op. cit.*, p. xxxii.
[5] Text in Levi, *op. cit.*, pp. 93–107.
[6] Levi, *op. cit.*, p. 93.
[7] The text under discussion is codex No. 4315-H at the Library of the Leiden University.
[8] Levi, *op. cit.*, p. 75.
[9] *Ibid.*, p. 16.

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also the *e*, *ai*, *o*, *au*. The chronological order of the vowels is also similar to that followed in Sanskrit, but the order of the later consonants has been as follows: *ya*, *ra*, *la*, *va*, *śa*, *ṣa*, *sa*, *aṅg*, *aḥ*. The list does not include *ha*, *ḍa*, *ḍha* and the *candravindu*. We have said before that the order of sibilants is different, but that the usual order of the vowels and consonants was not unknown in Java appears from the list provided in the *Sang Hyang Kamahāyānikan*,[1] a work belonging to the ninth-tenth century A.D.

The short vowels, such as *a*, *i*, etc., have been called *ekamātra*, consisting of one syllabic instant, while the longer vowels like *ā*, *ī*, etc., have been called *dvimātra*. The diphthongs, sounding three such instants, have been called *trimātra*. The vowels have again been classified into two categories, viz. *dīrgha* (long), i.e. *guru* and *laghu* (short), i.e. *hrasva*. The consonants have also been classified as *ghoṣa* (sonant), *anunāsika* (nasal) and *anta(ḥ)-svara*. The term *ghoṣa* or sonant denotes all consonants, excepting the *anunāsika* and the *antaḥsvara* to be described presently. The *anunāsika* refers to the nasals, while the last category includes *y*, *r*, *l*, *v*, *s*, *ś*, *ṣ* (*s* is placed before *ś*), *h*, but in this sense the use of *antaḥsvara* is rare in the grammatika of India. In the Sanskrit grammar, the *antaḥsvara* denotes only *ya-ra-la-va*,[2] while *anunāsika* is usually denoted by *anusvara* as well as *ṅ*, *ñ*, *ṇ*, *n* and *m*. It will appear, therefore, that the svaravyañjana has not recognized the distinction between surds (i.e. aghoṣa: the first and second *varṇa* of the *vargas* and *ś*, *ṣ* and *s* or what is technically known as *khar*) and sonants. The Sanskrit authority for such classification may be searched in India. The consonants have also been classified under the headings of *mūrdhaṇya* (cerebral), *tālavya* (palatal), *dantya* (dental), *mahā-prāṇa* (aspirate) and *alpaprāṇa* (unaspirate). The terms for gutturals and labials could not be found by Gonda in the MSS. he consulted.[3] The text also refers to *udantya* and *anudantya*, which respectively seem to stand for Skt. *Udātta* (highly accentuated) and *anudātta* (low sounding). The Old-Javanese explanation of the former term is: 'the *akṣaras* which when being pronounced sound high', while the latter term is explained as 'the syllable which sounds low, a fluttering of the tongue'.[4] The Sanskrit technical terms were explained to the Indonesian learners by Old-Javanese explanations. This perhaps implies that the written and oral languages of the young learners, and hence of the people, were the same. The dissimilar position between Sanskrit and Prākṛt in India may be recalled in this connexion. In the text, the word *mūrdhanya*, for instance, has been explained as *'ikang akṣara mĕḍala ing śiraḥ'*, i.e. the sound of the word which emanates from the head or cerebral parts.[5]

After this the author has described the rules of Sanskrit sandhi. These rules have been grouped under what is called prakriya-sandhi: svarasandi,[6] vyañjanasandi[6] and visargasandhi. The compound prakriya-sandhi ( = prakriyāsandhi) is an interesting compound formed in right Indonesian style omitting the Indonesian *ni* in between prakriyā and sandhi. In Sanskrit we should normally say sandhiprakriyā or sandhiprakaraṇa, i.e. the method of euphonic joining (of the final and initial sounds of words). Besides providing *sandhi*-rules, the author has also offered some interesting examples illustrating *sandhi*-rules. We thus read: *ikang ikāra dadi ya*,

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[1] J. Kats, *Sang Hyang Kamahāyānikan*, 1910, pp. 53–55.

[2] *Ya-ra-la-va antaḥsthaḥ*. They are so called, because they are infixed between the *sparśavarṇa* and the *uṣmavarṇa*.

[3] *Op. cit.*, p. 105.

[4] *Ibid.*

[5] Sanskrit: ṛturaṣāṇāṃ mūrdhā.

[6] The spelling should be: °*sandhi*.

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i.e. the sound *i* will be transformed into *ya*, and in illustration of this he offers ai+am > ayam. According to Sanskrit grammar, it should have been āyam, as Pāṇini's dictum[1] of eco'yavayavah—ecah kramadayah av ay av ete syaraci dictates. The same dictum is applicable to the Javanese author's illustration of bai+em > bayĕm. The apparent deviation from Sanskrit rule is perhaps to be explained by the fact that in actual practice Old-Javanese hardly distinguishes between short and long vowels, except in the case of metres. Among other rules he cites: *ukāra dadi va*, i.e. the sound *u* will be transformed into *va* and in illustration of this dictum he cites the example of va+u+i = vavi. The writer has said that if *a* is followed by *u*, the resultant of the joint sound will be *o* and in illustration of this he has furnished our well-known example of gaṅgā+udaka > gaṅgodaka. Among other examples we find ka+ulah > kolah. Gonda has truly observed that as part of the examples pertains to the pure Javanese vocabulary, it is evident that the author has tried to explain Sanskrit rule and examples by pointing to parallels in his own language and even by interpreting the latter, as if the words were Sanskrit. The application of Sanskrit *sandhi*-rules has also been observed in some charters of Java in the combination of the Old-Javanese honorific and the proper names.

In some MSS. of the *Svaravyañjana*, one comes across a section called *Kṛtabasā*, probably an abbreviation and corrupted form of Saṃskṛtabhāṣā. The text offers translations from Sanskrit to Old-Javanese, obviously in an attempt to make the young learners to learn Sanskrit. It is an exercise in bilingualism. We read thus: saḥ vṛkṣaḥ = ikang kayu. Saḥ vṛkṣaḥ tiṣṭhati = lāgi yaḥ. In translating the second Sanskrit sentence, the author has not thought it necessary to translate the first two terms, as these were translated under the first example. Another interesting specimen of the nature of this linguistic exercise may be offered from the text. It writes: saḥ gajaḥ = ikang liman, i.e. the elephant; sinimbat iya, i.e. it was hurt; dening apa = by what? saḥ vṛkṣaḥ: ikang kayu, the (that) tree; tena vṛkṣeṇa, de nika sinimbat iya, i.e. by that it was struck; nipātitaḥ, tiba ya: it fell; saḥ gajaḥ abhihataḥ bhavati, siddha ya: it is accomplished or done.[2]

The author has also offered some examples of neuter genders:

tat kānanam = ikang alas
tat kānanam kusumitam = makambang iya.

The translation is perfect, but interesting is the translation of saḥ latā by ikā udvad. Firstly, *saḥ* is to be read as *sā*. Secondly, Austronesian languages do not recognize any change due to gender, number or case. Accordingly the Old-Javanese word *ikā* can be explained either by thinking that the writer has introduced Sanskrit suffix *ā* into the Old-Javanese word to indicate gender, which would be rather unusual, or by thinking that since Old-Javanese does not recognize, in practice, the difference between *a* and *ā*, the use of the suffix *ā* in the word ika does not bear any special significance. He has also cited examples of instrumental cases (like: tena vṛkṣena) and plural numbers. Codex No. 4259 of the *Kṛtabasa* is partly a grammar and partly a lexicography. It deals, at its end, with some verbal forms. About the verb sthā, it notes: tiṣṭhati, tiṣṭhataḥ, tiṣṭhante, but the plural number has been wrongly stated in place of tiṣṭhanti.

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[1] 6.1.78 and Bhaṭṭoji's vṛtti thereon.
[2] Gonda, *op. cit.*, p. 106; *see also* Juynboll in *BKI*, 52, pp. 632 ff.

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Codex No. 3173 (1) in the Library of the Leiden University has been described as *Ngalamat sĕrat sandhi sestra*.[1] *The Catalogue of Vreede* also refers to a *Sĕrat Sandhi Sutra*,[2] but details of these MSS. are not known to us. Some cosmogonical works have also referred to anungasvara ( = anusvara) and vyañjana in certain portions of the text.[3]

A work which combines the functions of a grammar and lexicography is called *ekalavya*.[4] At the commencement of the work, we read: om avighnam astu namah siddham [Cod. 5140 (2)]. Van der Tuuk has stated[5] that the name is probably an aberration from *ekalāpya*, but Gonda thinks it to be the corrupted form of *ekārthalabhya*.[6] In both the cases, the meaning is the same, namely, to obtain the same meaning, i.e. synonyms. The text deals with words of identical syllables, e.g. bara, bari, baru, without considering the quantity of the vowels or the numerical value of letters; it also deals with synonyms for trees, metals, earth, water, clouds, stars, various gods, animals, parts of the body, mirror, house, boy, etc. In addition to these, the work also supplies a list of homonyms, such as sura: paṇḍita, sura: buṭa (i.e. bhūta), sura: devva (i.e. deva), sura: sajöng (Old-Jav.: spirituous liquor).[7] There are also some other Old-Javanese works of lexicographical nature, of which *Ādisvara*, referred to earlier, is one. The spellings are corrupted, e.g. kṣiti has been written as siti, bhūtala as buṭala, bhāṣā as baṣa, etc. The spelling of kṣiti as siti is instructive, as it shows that the word was pronounced by Indians in ancient Java in the right way (i.e. as kṣiti and not as khiti, as we often pronounce in Bengal), but the Javanese author took the most important element of the word as was clearly audible.

Codex No. 4259 of the *Kṛtabasa* referred to above also partakes the nature of a lexicography. It begins with an enumeration of the names of Gaṇeśa, Varuṇa and other gods, furnishes the names of beasts, etc., a list of the various synonyms of words, such as samādhi, pūjā, vrata, ekacitta, etc. These are followed by a new list of the names of gods, in which we come across 29 names for Indra, 31 for the God of Fire, 27 for the God of Wind, 29 of Kāma, 48 of Moon. Then occur 59 synonyms for paṇḍita, 28 for bird, 48 for ulā or snake, 9 for Yama, 8 for Bṛhaspati, 29 for king. In Codex No. 5175,[8] we get a list of the celestial damsels like Padmamūrti, Tañjung Biru, Gagar Mayang and Sulasih. In this text and in Cod. 2049(5),[9] we get 10 names of Moon (some in corrupt spellings), such as Saśī, Sitansu, Sasangaku, condra, vassanta, rati, sasadara, endung, pravañca and Tien. In the prose version of the *Cantakaparva*, we find in one part the explanation of the names of the Sun, the Moon, devas, 7 vidyādharīs, etc. It also boasts of offering an explanation of 'all anecdotes'. As this text contains some Chinese and Arabic words, it does not appear to be a very old one.

The text *Sukṣmabasa* (i.e. Sukṣmabhāṣā) similarly furnishes a list of words and has offered an explanation of the names of some scriptures and

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[1] Juynboll, *op. cit.*, p. 218.
[2] Vreede, *Catalogus van de Javaansche en Madoereesche handschriften der Leidsche Universiteits-bibliotheek*, 1892, pp. 362-63.
[3] Gonda, *op. cit.*, p. 105.
[4] Juynboll, *op. cit.*, Cod. 3906(1) and 5140(2).
[5] *KBNWB*, I, p. 146.
[6] Gonda, *op. cit.*, p. 125, f.n. 38.
[7] The text has not been published. For summary *see* Gonda, *op. cit.*, p. 125, f.n. 38.
[8] At the Library of the University of Leiden.
[9] Vreede, *op. cit.*

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mystical or metaphorical interpretation of names and facts occurring in sacred literary works.

In the famous Library at Jakarta, we have an Old-Javanese text of which the first part deals with metrics, while the second part is like a Sanskrit kośa or dictionary.[1] The work is indifferently called *Caṇḍakiraṇa* or *Amaramālā*. The term Caṇḍakiraṇa may mean keen rays or be the corrupted form of Chandaḥkiraṇa (the rays of metres) or Chandaḥkarana (the making of metres). If the interpretation be correct, the nomenclature is at least partially justified, because the first part of the work deals with metres; the last part is something like a Skt. Śabdakośa or lexicography. In between is set a part wherein the name of *Amaramālā* occurs. It has been stated that the work was caused to be translated by king Jitendra of the Śailendra dynasty.[2] No king Jitendra of the Śailendra dynasty is known to us from any other source, but since the Śailendras ruled in Java from *c.* 750 to *c.* 850 A.D., this work might have been composed during this time. In this work, the synonyms have been enumerated in ślokas, but every series of synonyms is followed by a recapitulation in Old-Javanese. In this list, the synonyms of Deva, for example, have been furnished in the following way:

'Amarās tridaśāḥ proktāḥ girvānā vivudhāḥ surāḥ |
vṛndārakā aditijāḥ nirjarā dānavadviṣaḥ ||
lekhāḥ svarvvāsino'hsvapnāḥ tridiveśāḥ sudhāśinaḥ |
devāḥ svargasadohmattyāḥ ṛbhavo'hmṛtapās tathā ||
āditeyāḥ sumanasaḥ suparvvāṇo divaukasaḥ |
devatās tāḥ striyāmuktāḥ ṣaṇḍhe'htha daivatāni ca ||'

If we compare this and similar other lists with those of the *Amarakośa*,[3] it will be found that the serial order of words is not the same and there are new words in either lists, although the number of words is approximately the same. The second noteworthy point about the list is that the ślokas are followed by Old-Javanese explanations, e.g. the first of the ślokas quoted above has the following commentary: ngaran ing daivata ika kabeh, i.e. names of divinities (are) these all. The Sanskrit portion of the text then continues, in the usual way, followed by Old-Javanese explanations in the manner described above.

Kern invited attention to the word sudhāśin (lit.: feeding on sudhā, i.e. nectar) as against the synonym sudhābhuj in Hemacandra's list. The component sudhā, however, occurs in such forms as sudhāpa, sudhāliḥ, sudhāśana in Sanskrit dictionaries.

The name of Śiva, as given in the Old-Javanese text, may also be furnished here:

Śivasarvvavirūpākṣāḥ mahādevo maheśvaraḥ |
śrīkaṇṭhaḥ śaṅkaro bhargaḥ somadhṛt nīlalohitaḥ ||
kapardīca kṛttivāsāḥ rudro gaṅgādharo haraḥ |
kṛśānuretāḥ kāmāriḥ pinākī vṛṣaketanaḥ ||
dūrjjitis tryamvako bhimaḥ sarvajño giriśo mṛḍhaḥ |
ugraḥ paśupatiḥ śūlī vāmadevo gaṇādhipaḥ ||
īśa īśvara īśānaḥ kapālī parameśvaraḥ |
śipiviṣṭo vyomakeśaḥ tripurāris trilocanaḥ ||
vṛṣabhadhvajaḥ kratu (dhvaṅsī bhūteśaś candrasekharaḥ) |
śambhuḥ śarvo bhavaḥ sthāṇuḥ śūlabhṛt somabhṛd dharaḥ ||

[1] Kern, *VG*, IX, pp. 273 ff.; Juynboll, *op. cit.*, I, pp. 170 ff.; Gonda, *op. cit.*, p. 107.
[2] Krom in *Mededeelingen Amsterdam Academy*, LVIII, pp. 203 ff.
[3] *Amarakośa*, 1.1.1, Colebrooke's edition, 1808.

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In this way, other ślokas have enlisted the names of Umā, Brahmā, Viṣṇu, Śrī, Buddha, Kuvera, Kāmadeva, etc.

It is interesting to observe that in the prose version of Brahmā's names, a list of the names of the Fire-God has been enumerated, though the writer ends by observing that all these names refer to Brahmā who was often connected with Fire in Java. This is true enough, as Old-Javanese inscriptions from Central Java testify.[1]

The second section of the MS. contains a vocabulary in which the names of the months, parts of the body, objects like house, river, smoke, etc., together with their meanings, are systematically arranged. Besides, it contains lists having homonyms or words with a plurality of meanings, e.g. pāṅśu, kṣoda, reṇu, cūrṇa, dhuli = lĕbu (Old-Jav.: dust), etc. It also explains a number of polysemous Old-Javanese words.[2] On account of the occurrence of Old-Javanese explanations or meanings given beside the Sanskrit text, it is obvious that these texts were used to facilitate the reading and writing of Old-Javanese texts.[3]

While discussing this work, Kern observed[4] that the lists incorporate the names of those gods and goddesses who had attained prominence at the time of compilation of this work. Krom,[5] however, believes that the lists may contain some names of Sanskrit origin which had not, at the time of compilation of the text, yet come into vogue in Java and that some of these names might have been interpolated into the text at a later date.

### (*b*) Prosody and Rhetoric

From the study of Sanskrit grammars and lexicographies, as adapted in ancient Java, we may now turn our attention to the study of Sanskrit prosody and rhetoric as applied to Old-Javanese poetical works. As all Old-Javanese poetical works are coached, broadly speaking, in Sanskrit metres, it is obvious that there must have been Old-Javanese texts to deal with the same. Such indeed has been the case. An Old-Javanese text of this type is called *Vṛttasañcaya*. The title of the book and the name of the author are to be found at the colophon, where we read: *iti vṛttasañcaya, cakravākadūtacarita, Tanakung*. It is, however, difficult to say why the author selected a second name for this work. The name may recall the name of the immortal poem *Meghadūta* of Kālidāsa and other much less known dūta-kāvyas, but it is difficult to discover any analogy between the two, unless one thinks, in a flight of imagination, that the poets of India and Java who live on opposite shores of the ocean, just like traditional cakravāka-couple who are supposed to live on either shore of the lake during cruel nights,[6] have met in common homage to Sanskrit metres, and this offering of Sanskrit metres has been made by Tanakung in the guise or role of a traditional Cakravāka. Be that as it may, the work is a highly interesting one; the text was edited by Friederich[7] as early as 1849. Kern re-edited the text[8] with translation and notes in 1875. In an introduction to this work Kern had observed that the source of this work was India

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[1] Inscription of Kĕmbang Arum, dated A.D. 902 in *OV*, 1925, Bijl. B, pp. 41–49; H. B. Sarkar, in *JGIS*, V (1938).

[2] Gonda, *op. cit.*, p. 107.

[3] *Ibid.*

[4] *Op. cit.*, p. 281.

[5] *Hindoe-Javaansche Gesciedenis*, 1931, p. 151.

[6] It will appear from quotation, given below, that this tradition was known to Old-Javanese poets.

[7] In the *VBG* dl. XXII.

[8] Reprinted in *VG*, I, pp. 67 ff.

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and that the rules of metre were drawn up in the pattern of sūtras for aid of memory, as in Pāṇini. The author's knowledge of Sanskrit has, however, been questioned by Gonda,[1] who says: 'It is, however, far from likely that Tanakung who inserted corrupted Sanskrit forms in his work read the original Indian texts.' This implies—if the view of Gonda be correct—that Tanakung used another Old-Javanese work which dealt with Piṅgala's *Chandaḥsūtra* but was of inferior quality and accordingly soon went out of use. In any case, it is possible that the Sanskrit model for the work of Tanakung may one day be discovered in India. The author has indeed referred to the name of Rāmaśarman in the 4th śloka and those of Piṅgala and *Piṅgalaśāstra* in the 7th and 109th ślokas respectively. Rāmaśarman is an Indian author on metrics and the reference to *Piṅgalaśāstra* might tempt one to affiliate the work to the Sanskrit *Piṅgalachandaḥsūtra* of India. A *Piṅgalakoṣa* is said to have been composed by the sage Piṅgala who made discourses in the guise of a nāga. As the names *Piṅgalakoṣa* and *Piṅgalachandaḥsūtra* are similar, it may be conjectured that the two works might be identical, but Kern,[2] after a comparison of the *Vṛttasañcaya* with the *Piṅgalachandaḥsūtra* and Kedāra's *Vṛttaratnākara*, came to the conclusion that these works are not interconnected. We know that Yādavaprakāśa, originally a guru of the great philosopher Rāmānuja and later on his disciple, was a famous annotator of the *Piṅgalachandaḥsūtra*. The *Bhāṣyarājaṭīkā* of Yādavaprakāśa and the *Mṛtasañjīvanī* of Halāyudha are contemporaneous works, but the ṭīka of Yādavaprakāśa has shown greater competence in both Vedic and classical metres. Consequently we may hold the view that a more reliable text of the *Piṅgalachandaḥsūtra* has been reflected in the ṭīkā of Yādavaprakāśa. If this ṭīkā is published, it will provide us with another opportunity to compare the text of the *Vṛttasañcaya* with that of *Piṅgalachandaḥsūtra*. I may invite the attention of the Indian Sanskritists to this field of research work. It may be stated in this connexion that the *Vṛttasañcaya* has dealt with vṛttas or metres containing a fixed number of syllables; it does not deal with mātrāchandas (metres measured by the number of prosodical instants) and gaṇachandas (metres measured by feet).

In the portion of the text where the theories or sūtras have been discussed, the author has furnished us with names of different classes of metres extending from 4×1 feet to 4×27 feet. The theories have been described in stanzas 3–8, while the examples or model stanzas run from 9 to 108. Of these stanzas, Nos. 104, 105, 106 and 107 are illustrations of the metres discussed in the earlier section of the work. We thus get 96 pure Sanskrit metres discussed here. The author has even discussed the daṇḍaka-metre which sounds like half-prose and half-verse. Gonda has drawn our attention to the fact that an Old-Javanese kakavin-metre which has not been given any specific name occurs in this work. He has cited stanza Nos. 8, 109 and 111 as example and has observed that it may be described as a kind of vikṛti and is sometimes met with in the Old-Javanese kakavins. It might have been the intention of the author to modify the Sanskrit metres to a certain extent, by addition or alteration, and create new types of metres, as the one referred to above.[3]

Besides the *Vṛttasañcaya*, other books on prosody were also composed in Java. One of them is called the *Vṛttāyana*. Unfortunately the text has not yet been published. It has discussed metres like vṛṣabhagativilasita,

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[1] *Op. cit.*, p. 108.
[2] *Op. cit.*, pp. 95 ff.
[3] Cf. Gonda, *op. cit.*, p. 126, f.n. 46.



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maṇiguṇanikara and other metres.[1] The metres dealt with in the *Cantakaparva*[2] are somewhat different from those discussed in the *Vṛttasañcaya*.

It must not be imagined that such works in Sanskrit metrics constituted an exercise in futility. As a matter of fact the kakavins or Old-Javanese poems have liberally utilized the Sanskrit metres for the composition of their works. If one studies the MSS. of the kakavins, it will appear that the name of the Sanskrit metre used in a particular sarga has often been mentioned in the body of the text in that sarga. The syllables of each pāda do not always conform to the Sanskrit rule, but these defects may be due either to the insufficient comprehension of the Sanskrit rules or due to the poor knowledge of the copyists of MSS. In some cases at least, such copyists have made mistakes regarding the name of the metres, e.g. Praviralalita in the place of Pravaralalita, Sapratitala instead of Pṛthvītala, Svaladara for Sragdharā, etc.[3] In some MSS., we come across the names of metres composed in Java. For example, the second canto of the *Arjunavivāha* has been written in the Sanskrit Vikṛti-metre, but in a Javanese MS. of that work the name has been written as Vĕgang Sulañjari.[4] I. G. P. Djilantik has given further examples of such corrupted forms from a Balinese summary of the Indian metres used in the *Nāgarakṛtāgama* (fourteenth century A.D.).[5] In connexion with the discussion on metres, Gonda[6] has invited our attention to the interesting fact that 'the Sanskrit term Śloka, a stanza, especially a particular kind of common epic metre consisting of four quarters of eight syllables each, has been preserved in Sundanese where siloka, which is no doubt the identical word, denotes "apothegms, metaphorical sayings, especially when dealing with esoteric or religious lore"; it seems, however, to apply in a more particular way to texts composed in the pantun style, i.e. in that kind of literary form which is neither prose nor poetry, but historically speaking preceding both, consists of shorter or longer series of free rhythmic unities from about 7 to about 16 syllables (in Sundanese unities of 8 or of about 8 syllables are preferred), and which can be called by the Latin name, carmen style. In a comparable way the Sanskrit pāda "the fourth part of a regular stanza" has been preserved in Javanese and Sundanese to denote a stanza as well as a punctuation mark or stop between two lines of a stanza, between two stanzas or at the end of a phrase or sentence.'

It is noteworthy that the Old-Javanese poets have usually commenced their works, like their Indian counterparts, with a svastivacana or maṅgalācarana, i.e. with words of benediction or well-being for all. This custom has been enunciated in the *Sāhityadarpana* as: *ādau namaskriyāśīrvā vastunirdeśa eva vā*. Accordingly, many Old-Javanese works, written in prose or poetry, and even some inscriptions, have begun their work with '*oṃ avighnaṃ astu*'. Immediately thereafter, homage has been paid to gods like Śiva, Sarasvatī, Buddha, Gaṇeśa or other deities. From this point of view, the beginning of the *Raghuvaṃśa* and the *Mudrārākṣasa*, for instance, may be compared with the beginning of the *Nāgarakṛtāgama* and many other works. C. Hooykaas has observed[7] that, excepting the Old-Javanese *Rāmāyaṇa*, 'other Old-Javanese kakavins, as far as known

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[1] Cf. Gonda., *op. cit.*, p. 108.
[2] Juynboll, *op. cit.*, II, cod. 4575.
[3] *See* Kern, *op. cit.*, pp. 75 ff.; Gonda, *op. cit.*, p. 108.
[4] Kern, *Kawi-Studien*, 1871, p. 100; Gonda, *op. cit.*, pp. 108-9.
[5] *BKI*, LXXXI (1925), pp. 116 ff.; Gonda, *op. cit.*, p. 109.
[6] *Op. cit.*, p. 109.
[7] *VKI*, 16 (1955), pp. 19-20.



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to me, without exception, have their initial maṅgala and an intricate one too! thereby proving that their poets were not inspired by Yogīśvara's *Rāmāyaṇa* only, but must have been conversant either with Indian poetics or with Indian kāvyas, or possibly with both of them.' The practice of maṅgalācaraṇa has been observed not only in the beginning of Old-Javanese poems, but also sometimes at the end. The Old-Javanese poetical works like the *Kṛṣṇāntaka* and the *Nāgarakṛtāgama*, for instance, may be cited as illustrations. Sometimes the poets, both in India and Java, have furnished particulars about themselves or their family in the works they have composed. We may refer, in this connexion, to the *Arjunavivāha* of poet Mpu Kanva, the *Nāgarakṛtāgama* of the poet Prapañca, the *Śiśupālavadha* of Māgha, the *Harṣacarita* of Bāṇa, etc.

In writing the Old-Javanese poems, the authors have liberally utilized Sanskrit metres of the widest varieties ranging from 8 syllables in a quarter to 25 syllables in a quarter. The poets have sometimes followed the dictum: *ekavṛttamayaiḥ padyaiḥ, avasane'hnyavṛttakaiḥ*. It may be admitted that although its universal application would have fulfilled the desires of the Sanskrit theoreticians, this has not been done. The monometric sargas have been illustrated in 188 cantos of the *Bhomakāvya*, 54 cantos of the *Harivaṃśa*, 40 cantos of the *Smaradahana*, 36 cantos of the *Arjunavivāha*, 52 cantos of the *Bhāratayuddha* and 98 cantos of the *Nāgarakṛtāgama*. In this respect they differ from the 25 polymetric (canto 5 is in monometric Rajanī-metre) cantos of the Old-Javanese *Rāmāyaṇa*, but if we agree that this deviation is due to the fact that the Old-Javanese *Rāmāyaṇa* was designed to teach the rules of Sanskrit versification, as proposed by C. Hooykaas[1] and with which I agree, this deviation may be excused. Polymetric cantos, from a structural point of view, may not, therefore, be adduced as reasons to distinguish the Old-Javanese *Rāmāyaṇa* from other Old-Javanese kakavins.

How defiant Yogīśvara, the author of the Old-Javanese *Rāmāyaṇa*, has been in executing the dictum of the Sanskrit theoreticians may be realized from the fact that while he has used different metres at the end of the first and the second cantos, he has used several different metres at the end of almost every other canto. In India, deviations have no doubt been observed, for instance, in the 6th, 11th and 19th cantos of the *Raghuvaṃśa*, 3rd, 4th, 14th, 16th and 17th cantos of the *Kumārasambhava*, 1st, 4th, 6th, 11th and 14th cantos of the *Kirātārjunīyam*, the 1st, 7th, 15th and 20th cantos of the *Śiśupālavadha*, etc.,[2] but the extent of this deviation in the work of Yogīśvara has surpassed anything found in the mahākāvyas of India. It seems likely that both parts of the Sanskrit dictum referred to above were followed in the early Sanskrit poems of India, but in course of time all rules of discipline in this regard were thrown to the winds. It may be remarked in passing that, of all the metres used in the final stanzas of the major poetical works in India, Mālinī and Mandākrāntā appear to be the most popular ones, and they have also retained their popularity in the Old-Javanese *Rāmāyaṇa*, where 19 different conclusive metres have been used, but Mālinī and Mandākrāntā have been used most often. The total number of different Sanskrit metres used in the Old-Javanese *Rāmāyaṇa* is 81.

C. Hooykaas who has made an admirable study of the Old-Javanese *Rāmāyaṇa*, with special reference to the problem of interpolation in kakavins,

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[1] *VKI*. 16 (1955), p. 28. The poem might have been designed not only to teach prosody but also rhetoric, as the wealth of examples in the latter respect is also immense.

[2] *Ibid.*, pp. 25–30.

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has observed that the 'O.-J. *Rāmāyaṇa* has some 268 metrical changes in 2,774 stanzas, *Bhomakāvya* has some 118 cantos = 117 metrical changes in 1,375 stanzas. The average is more or less the same. The picture of the monometric passages offers a striking resemblance. But *Bhomakāvya* shows no longer a trace of the sarga-structure; this was already in decadence in OJR, and seems never to have taken solid root on Javanese soil. There are still one-stanza cantos, 10 two-stanza cantos—queer cantos indeed—apparently the remainder of (*a*) former conclusive or intermediary stanza(s). These separate stanzas soon became obsolete; *Harivaṁśa*, *Smaradahana* and *Arjunavivāha* still have a few of them, but that passes'.[1]

Whether one agrees with this view or not, the fact remains that canto divisions have run down almost to the last days of Majapahitan greatness and have been a persistent factor in the poetical compositions of ancient Java. In the literary history of India, the mahākāvyas had their day and ultimately went out of fashion. The phenomenon observed in Java may have a similar beginning and a similar period of decline: it may or may not have anything to do with the process of acculturation.

The employment of Sanskrit metres in an Austronesian language is thus highly interesting and would be a rewarding study for the Indian Sanskritists. The use of a Sanskrit metre to an Old-Javanese stanza may be illustrated below for a practical demonstration.

The metre is Bhujaṅgaprayāta and the rule is: Bhujaṅgaprayātam caturbhiryakāraiḥ, i.e. ◡ — — ◡ — — ◡ — —

We take the stanza from the *Brahmāṇḍapurāṇa* Kakavin:

| ya | ya | ya | ya |
|---|---|---|---|
| ◡ — | – ◡ — — | ◡ — | — ◡ — — |
| aněng | něriti pwa | sakěng | parvvatāgöng |
| ya | ya | ya | ya |
| ◡ — — | — | ◡ — | — ◡ – — |
| gunung | mās arunyā | ngaranyā | suteja |
| ya | ya | ya | ya |
| ◡ — | — ◡ | — ◡ — | — ◡ — — |
| ya tā | cangkrama śrī | mahānīlakaṇṭhā | |
| ya | ya | ya | ya |
| ◡ — | — ◡ — — | ◡ — | — ◡ — — |
| karing | muñcavān mās | pucaknyātiśobha | |

From the discussion made above, it must have been abundantly clear that the Old-Javanese authors, whatever their defects from the viewpoint of strict rules of Sanskrit metres, have shown remarkable resilience in the empolyment of Sanskrit metres to Old-Javanese language. The Old-Javanese authors, however, enjoyed an advantage which was denied to the Sanskrit authors. The rules of Sanskrit metres are exceptionally rigid, and if one or two words be missing from a pāda we can restore the missing words with considerable success, because, unlike in Old-Javanese, the short and long syllables of Sanskrit metres must follow a particular pattern. Words of such syllabic value may easily fill up the lacunae. In Old-Javanese, we may lengthen or contract a sound and in appropriate cases even delete a letter to meet the exigencies of the metre. Take for example the Old-Javanese word *Hĕmas* meaning gold. To suit the demands of the metre we can read the word *Hĕmas* as *Ĕmas*, *mās* or *mas*. The *ha*

[1] *VKI*, 16 (1955), p. 37.

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infix or prefix may also be elited in certain cases. Such latitude is not at all possible in Sanskrit.[1]

Not only in prosody, but also in the realm of alaṃkāra or literary embellishments have Old-Javanese poets shown their talents. Many of them have created a new world of light and colour by judicious employment of Sanskrit alaṃkāra like anuprāsa, yamaka, apanhuti, upamā, rūpaka, śleṣa, etc. It is true that stylistic devices, such as upamā, rūpaka, anuprāsa, utprekṣā, atiśayokti and alaṃkāras of similar strain, have a universal appeal, but, since the Javanese authors have liberally borrowed from Sanskrit prosody and special types of Sanskrit rhetoric, the presumption is that the non-special or conventional types of rhetoric might have also been derived from the Sanskrit authors. C. Hooykaas has observed: 'It remains to be investigated whether Daṇḍin or one of his colleagues was a source of inspiration and normalization for the Javanese poets; also what they borrowed and what they rejected.'

Yogiśvara, the author of the Old-Javanese *Rāmāyaṇa*, whose original name, according to Balinese tradition, was Rājakusuma or Kusumavicitra, was not only a master in the field of Sanskrit versification but also a remarkable artist in the use of Sanskrit rhetoric. We may cull an example of Sanskrit anuprāsa from his *Rāmāyaṇa*. In the 5th canto of his work we read: vika śuci suddha saiva-śira sātvikasanta, etc., but this example, or indeed any that the Javanese poets can supply, has been surpassed by one of their compatriots, a Javanese author from the fourteenth century. Thus writes poet Prapañca (canto 96, metre: *Vipulāvaktra*):

> Prapañca pracacaḥ pañca, pracacad/pocapan/cĕcĕd
> prapöngpöng pipi pucce prĕm pracongcong cĕt pacĕḥpacĕḥ
> tan/tatatīta tan tutĕn tan tĕtĕs tan tut ing tutur
> titik/tantrī tateng tatva, tuhun/tāmtām/titir ttitiḥ

Numerous examples can be culled from the *Siśupālavadha* and other Sanskrit works of India. We do not know what the boastful Ghaṭakarpara, who took special delight in the composition of anuprāsa, would have said, had he read this work.

The Old-Javanese poets have also used yamaka with remarkable effect. According to the *Kāvyādarśa*,[2] the yamakas may be used at the beginning, middle or end of the strophes. In 1955, C. Hooykaas had examined 80 yamakas in cantos XVI, XVII, XIX, XXI, XXIII–XXVI of the Old-Javanese *Rāmāyaṇa*. Aichele, who pioneered the study of Sanskrit alaṃkāra as employed in Old-Javanese poems, in 1926, has not only discussed the use of anuprāsa and yamaka by Old-Javanese authors, but has also illustrated the use of upamā, rūpaka, utprekṣā and apanhuti (nihnuti).

From the viewpoint of artistry, I could not find a better example of yamaka than the one proffered by Mpu Dharmaja in his *Smaradahana*,[3] which has fulfilled all the conditions of Daṇḍin in one illustration.

He writes:

> '*Rĕmbang-rĕmbang* apantaran kalihibĕn
> pāng pung pakis pangag/rĕmbat
> nampu *kajar-kajar* kamumu lĕn
> *sung-sung* guyunyānangis/nkāne dūnya
> savaḥ kapaṅgih alangö lvaḥ *gung gung*
> akvĕḥ pakis/sarvvecchāvikuṭak taluktak
> akṛuk *syök syök* dhvaninyāngĕtĕk'

[1] Cf. in this connexion C. Hooykaas in Indisch-Indonesische poezie.
[2] 1/61.
[3] Ed. Poerbatjaraka, *Smaradahana*, Bibliotheca Javanica, No. 3, 1931, p. 28.

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In the example cited above, the use of rĕmbang, kajar, sung, gung and syök, each one in doubles, may remind one of numerous similar examples provided in Sanskrit literature. Even an example of sandaṣṭa yamaka, in which the first word of a pāda begins with the last word of the preceding pāda, has been provided in the Old-Javanese *Rāmāyaṇa*.[1] There are about 12 such examples in OJK.

'sakvĕh nikanj talaga tan hana tanpa *tuñjung*;
*tuñjung*nya tan hana kurang paḍa mĕsi *kumbang*;
*kumbang*nya kapva muni tan hana tanpa *śabda*;
*śabda*nya karṇasukha tan hana tan manojña'

The Old-Javanese stanza cited above is an exact translation of the following śloka of the *Bhaṭṭi-kāvya*, which also offers an example, though not exquisite, of the sandaṣṭa yamaka. The śloka runs as follows:

'na tajjalaṃ yanna sucaru*paṅkajam*
na *paṅkajaṃ* tad yad alīna*ṣaṭpadam*
na *ṣaṭpado*'sau na juguñja yaḥ kalam
na guñjitaṃ tanna jahāra yan manaḥ'[2]

In some places, the Sanskrit and Old-Javanese authors have used the last letters of the preceding words to start the following words to create musical effect on the ears. One may recall in this connexion the beautiful verse of the *Gītagovinda*[3]: mṛgamada-saurabha-rabhasa-vasaṃvada-nava-dalamāla-tamāle, which we can compare, for example, with a verse of the *Nāgarakṛtāgama*: tama sansara ring *gatyā tyāga* ring rasa sanmata. The use of *rabha* in Sanskrit and *tyā* in the Old-Javanese had the same end in view, viz. to create music by the judicious use of word-sounds. The Old-Javanese verse has another characteristic: the second half of the verse, if read in a reverse direction, will be the same as the first part of the verse. It seems that the Old-Javanese poets have swum swan-like in the sea of Sanskrit alaṃkāra, just as they have done in the domain of Sanskrit chandaḥs. Even highly technical alaṃkāras, like apanhuti, for instance, have been brought within the ken of their experimentation, of which a beautiful example has been culled by Aichele[4] from the *Rāmāyaṇa* of Yogīśvara:

'śabda ning bhramara matta ya apuyĕ
yak rĕngö ya mahuyang hati mapanas
tulya parvvata se ḍĕng matunu muruva'.

Gonda[5] has cited a beautiful example of śleṣa from the Old-Javanese *Harivaṃśa*.[6] In this alaṃkāra, the words are grouped in such a way that it may convey double or contrasted ideas. We quote from him an extract in full, on account of his enunciation of the difficulties attending the use of such alaṃkāra. He says:

'This merit of artificial composition was also readily imitated by the Javanese authors. Their śleṣa add no little to the difficulties presented by many passages in their works. Not infrequently we grope in the dark as to the poet's intentions. Did he mean to express himself in an ambiguous way or to express two ideas, to relate two occurrences, at the same

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[1] 2/19.
[2] 2/19.
[3] 1/3.
[4] *OLZ*, 29 (1926), p. 937.
[5] *Op. cit.*, p. 398.
[6] 2/10.

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time, or do we not understand what he wrote because of our incomplete knowledge of the Old-Javanese idiom? Thus *Harivaṃśa*, 2.10, where a high audience-hall is, in a long simile, compared with a mountain of fire—its roof consisted of gold and jewels were used as building stones—the poet takes the liberty of adding that the clouds constituted resting places in the realm of wind: *rantun-rantunan ing ghanājajar aniṅgilis i nagara ning samīraṇa* (lit. "the resting places of the clouds stood in rows, in the realm of the wind"). We do well to remember that in Old-Javanese the Sanskrit loans ghana "cloud" and Sanskrit gaṇa "crowd, retinue" had become homonyms which for reasons of śleṣa or other stylistic devices might be interchanged. So we can interpret ghana also as gaṇa and conclude that the poet would give us to understand that the audience-hall had resting places for the persons dependent on the ruler of Dvāravatī. Very often it is not clear which words must be understood a double entente and what portion of a verse is free from premeditated ambiguousness. When the word aśoka (Sanskrit: Aśoka), the name of the well-known tree, the *Jonesia asoka*, the name of which suggests the idea of "being free from sorrow" is used in twofold sense, does it mean that other polyvalent words in the same passage form part of the śleṣa? And does an author, when speaking of a "golden terrace", suvarṇabhūmi, hint at the well-known geographical name Suvarṇabhūmi, this Sanskrit term being capable of double interpretation?'

We may now refer to the occurrence of similes and metaphors in the Old-Javanese poems. We read in the Bhāratayuddha kakavin composed in A.D. 1157:

> Uruk varnani vandiraniya kadi śoka
> makĕmoli pingala ling priya

i.e. the dambaru-tree looks pale like a pining wife separated from her husband.

A similar idea has been expressed in the *Nāgarakṛtāgama*:[1]

Lwir stryagring angraněhi rāgi molm ikanang cavintĕn avnĕs, i.e. the pale caviri-trees there wore the aspect of women, ailing, declining, lovesick, wilted.

Here pining women have been compared to pale-trees. Perhaps Sanskrit poets would have liked better to compare such women with drooping or pale creepers. Kālidāsa, for example, has written, while describing the Hemanta-season, in his *Ṛtusaṃhāra* (10):

'Priye! priyaṅguḥ priyaviprayuktā vipāṇḍutām yāti vilāsinīva.' 'Dear, the priyaṅgu-creeper has worn the sad appearance of a belle separated from her dear one.'

Such ideas are found in abundance in Sanskrit literature and we may refer to the *Ratnāvalī*,[2] *Meghadūta*,[3] *Raghuvaṃśa*[4] and other poems. Not only in the matter of describing pangs of separation, but also in offering descriptions of feminine beauty, poets have thought alike. In the Old-Javanese *Rāmāyaṇa* (12.38), the poet has described the eyebrows as bows and the eyelashes as plumes of arrows. Do not these things remind us of *Śṛṅgāratilaka* (14), *Kumārasambhava* (1.47) and *Gītagovinda* (3.3), among a host of others? Kālidāsa has stated in one place: this girl is like a hunter, her eyebrows are like the bows, her glances are like the arrows: ah! my

[1] 37/5.
[2] 2/3.
[3] *Uttaramegha*, 22.
[4] 24/1.

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mind has become, as it were, a deer. For similar or cognate expressions we may turn to *Meghadūta* (Pūrvamegha, 27 and Uttaramegha, 2.11), *Raghuvaṃśa* (16.48; 13.49; 9.28; 16.59; 7.27), *Mālavikāgnimitra*, 3.125; *Kumārasambhava*, 7.20 and 7.59; *Ratnāvalī*, 1.11; *Gītagovinda*, 3.5, etc. In the Old-Javanese *Rāmāyaṇa*, the king has been compared to the wishing tree;[1] in the *Tantu Panggĕlaran*,[2] the mother of Kumāra has been honoured with the same designation. Such descriptions are abounding in Sanskrit literature, specially in the *Purāṇas* and epic literature.

We now offer below a beautiful example of saṃśayopamā from the *Bhāratayuddha*,[3] a kakavin written in A.D. 1157:

'Ĕndah lvir mahurup langö gagana lĕn bhūmī,
sĕḍĕng ning kulĕm
kayvan yāṅgdadi megha megha matĕmaḥ kayvan
hiḍĕp ning mangö
vintang kĕmbang kĕmbang angjraḥ atĕmaḥ vintang
haneṅg amvara
luāhnyādadyam urut mahā ng urut adadyan
luaḥ larinyālaris——'

i.e. Beautiful! How the beauty of the Heaven and Earth reflects on each other in night. The forests (cast their shadows) on the clouds, the clouds (cast their shadows) on the forests—thus it appears to the poet. Can it be that the stars are flowers? The flowers scatter themselves hither and thither and transform themselves into the flowers of heaven. The rivers strike for the clouds, the clouds for the rivers—.

Daṇḍin in his Kāvyādarśa has elaborately described alaṃkāra (prosodical figures), mādhurya (the quality of sweetness) and bhāvika (vivid description) and numerous examples of these may be cited from Sanskrit and Old-Javanese literature. A striking example in the realm of ideas has been provided by the following stanza from the Old-Javanese *Arjunavivāha* kakavin.[4] The metre is Indravaṃśa:

'Sāmara divā-ratrinikāng surālaya
dĕning prakāśātmaka sarvva bhāsvara
anghing sĕkarning kumudājaring kulĕm
muāng cakravākān pāpasaḥ lavaṇa priya'

The poet says that in the Heaven, the difference between days and nights is not discernible, because luminous objects are scattering light. Only the night-lotuses are announcing that it is night; the cakravāka-birds, separated from their dear consorts, are announcing that it is night.

This stanza would certainly remind one of the famous verses of the *Udbhaṭasāgara*[5]:

'ghanatara ghanavṛndācchādite vyomaloke
dinamaṇi-rajanīśau nāmamātrāvaśeṣau |
divasa-rajanībhedaṃ mandavātāḥ śaśaṃsuḥ
kamala-kumuda-gandhān āharantaḥ krameṇa ||'

We may now present a description of the arrival of Kṛṣṇa at the court of the Kurus, as described by Mpu Sĕdah, author of the *Bhāratayuddha*.[6]

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[1] 6/148.
[2] Pigeaud, *Tantu Panggĕlaran*, pp. 72, 143.
[3] *OLZ*, 29 (1926), p. 938.
[4] 9/113 in *BKI*, 1926, p. 210.
[5] Ed. Pūrṇacandra Dɔ, 3/228.
[6] 23–26.

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It has been described that the people are rushing madly to see him; some of them could not put on their dress properly; some started moving, while combing their hair; some left off their toilette and started running, or moved with mirror and paint-brushes in hand. Their garlands remained unfinished, nay, their dresses fell down on the road.

This description may remind one of the svayamvara-ceremony of Aja,[1] where the poet has vividly narrated how the women ran to the windows to see Aja, their hair-tresses became dishevelled and garlands tore off, their toilette remained incomplete and they ran with paint-brushes to see the prince; their dresses and ornaments fell on the way.

Similar scenes have been described in the *Buddhacarita* of Aśvaghoṣa,[2] *Śiśupālavadha* of Māgha,[3] the *Kādambarī* of Bāṇabhaṭṭa,[4] the *Kumārasambhava* of Kālidāsa[5] and others. It is not probable that Mpu Sĕdah had read the Sanskrit texts referred to above. Then one has to answer why this striking similarity has occurred in the Old-Javanese work? May we not believe that by the twelfth century, such description had already become stereotyped in India and had, in that form, reached the isles of Indonesia in the wake of Sanskrit language and literature.

The foregoing pages must have made it abundantly clear that there is a vast field for the study of Old-Javanese literature from the viewpoint of Sanskrit grammar, lexicography, prosody and rhetoric. As I have stated at the beginning of this paper, its aim is not primarily to do a piece of research-work on this subject but to invite the attention of Indian Sanskritists, once again, to the vast field of this research-work where they can fruitfully continue the valuable work initiated by the Dutch and Indonesian scholars, notably by Kern, Aichele, Djlantik, Poerbatjaraka, S. Levi, Gonda and C. Hooykaas. The works of these scholars are not extensive, but they may serve as valuable introduction to the subject.

## Abbreviations

*BKI*—Bijdragen tot de Taal-, Land- en Volkenkunde van Nederlandsch-Indie.

Indian influences—H. B. Sarkar, Indian influences on the literature of Java and Bali, 1934.

*JGIS*—Journal of the Greater India Society.

*KBNWB*—H. N. van der Tuuk, Kawi-Balineesch-Nederlandsch Woordenboek, four volumes.

*OLZ*—Orientalistische Literatur Zeitung.

*OV*—Oudheidkundige Verslag.

Supplement—H. H. Juynboll, Supplement op den Catalogus van de Javaansche en Madoereesche Handschriften der Leidsche Universiteits-Bibliotheek, Vol. I, 1907; Vol. II, 1911.

*TBG*—Tijdschrift voor Indische Taal-, Land- en Volkenkun- de van het Bataviaasch Genootscap van kunsten en wetenschappen.

*VBG*—Verhandelingen van het Bataviaasch Genootscap van kunsten en wetenschappen.

*VG*—Kern, Verspreide Geschriften, Vols. 1–15.

*VKI*—Verhandelingen van het Koninklijk Instituut.

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[1] Cf. *Raghuvaṃśa*, 7/5–13; *Kumārasambhava*, 1/4.
[2] Canto III.
[3] Canto XII.
[4] Ed. K. N. Pandurang Parab, 1928, pp. 164 ff.
[5] 7/56–62.

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# SOME REFERENCES TO ANIMAL HUNTING IN ANCIENT SANSKRIT LITERATURE

By APARNA CHATTOPADHYAY

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The *Kathāsaritsāgara* of Somadeva provides us with some interesting material about hunting, a regular sport for the royalties in ancient and early medieval India. It is the chief outdoor recreation of the royalties in the *Kathāsaritsāgara*.

A study of the references[1] to hunting in the *Ṛgveda* leads one to the conclusion, drawn by eminent scholars, that hunting played a considerable part in the life of the Ṛgvedic Aryans[2] who indulged in it for livelihood, sport and protection of flock from the wild beasts.[3]

Hunting was as much a sport in the age of the Buddha[4] as in the Maurya Age.[5] Megasthenes provides us with a graphic and glorious picture of a royal hunting party.[6] The royal hunt was temporarily abolished by Aśoka in 259 B.C.[7] In the *Arthaśāstra*,[8] in the epics[9] and in *Manu*[10] the importance of hunting is noticed. The love of hunting of the Imperial Guptas is preserved in their coins.[11] In Kālidāsa[12] hunting is a regular royal pastime. As we pass on to the age of Harṣa we find the young prince Harṣa happily engaged in hunting in the wood, while his elder brother was fighting with the Hūṇas in the north-western frontier.[13]

In the *Kathāsaritsāgara* we find description of the hunting expeditions of king Udayana of Kauśāmbī,[14] prince Vajramukuṭa of Vārāṇasī,[15] prince Naravāhanadatta,[16] king Candrāvaloka of Citrakūṭa,[17] king Lakṣadatta of Lakṣapura[18] and king Vikramāditya of Ujjayinī.[19]

## HUNTING PARTY

A royal hunting party consisted of huntsmen, hunting dogs, horses and footmen. The royal hunter rode on an elephant. When the party

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1 *R.V.*, I, 125, 2; II, 42, 2; V, 15, 3; V, 74, 4; IX, 83, 4; X, 86, 4; 51, 6; 28, 10; 81, 61. *Vedic Index*, Vol. II, p. 173.
2 *Cambridge History of India*, Vol. I, p. 100.
3 R. K. Mookerji, *Hindu Civilization*, pt. I, p. 76. A. C. Das, *Ṛgvedic Culture*, pp. 221-22. *The Vedic Age*, p. 398.
4 *Jātaka*, No. 537.
5 Rock Edict, VIII.
6 Megasthenes, Fragm. XXXII.
7 V. A. Smith, *Early History of India*, p. 129.
8 *Arthaśāstra*, Bk. VIII, Ch. III.
9 *Mbh.*, Anuśāsanaparva, 116, 15; Vanaparva, 50, 7; *Rāmāyaṇa*, Ayodhyākāṇḍa, 18, 37, 40.
10 *Manu*, VII, 47–50.
11 Allan, *Catalogue of the Gupta Coins in the British Museum.*
12 *Raghu*, IX, 46-47; *Śak.*, Act II.
13 *Harṣacarita*, English Trans. by Cowell & Thomas, p. 132.
14 *Kss.*, XXI, 11–16.
15 *Kss.*, LXXV, 64-65.
16 *Kss.*, XLII, 2–7.
17 *Kss.*, XCIV, 8–14.
18 *Kss.*, LIII, 15–18.
19 *Kss.*, CXXII, 7–18.



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encamped in a spot, nets were pitched up on all sides and heaven resounded with the shouts of joyous huntsmen. Such is the description that we find in the hunting party of king Vikramasiṁha.[1]

*Hunting dogs*

In the *Kathāsaritsāgara*, we find, king Udayana employing dogs in the ravines while out on hunting.[2] The practice of employing dogs is as old as the Ṛgvedic Age. We find dogs mentioned in the *Ṛgveda* in the description of the capture of a boar in chase.[3] The excellent training given to dogs, for the purpose of hunting by Indians, impressed the Greeks including Alexander himself.[4] Hunting dogs are mentioned in Kālidāsa.[5] In the description of the hunting expedition of the Cāhamāna kings of Raṇastambhapura, fleet hunting dogs with golden necklaces are found in the *Hammīra Mahākāvya*.[6] In the *Mānasollāsa* the employment of trained dogs in hunting is mentioned.[7] In the *Rājataraṅgiṇī* we notice hunting dogs in the description of royal hunting.[8]

*Nets*

In the *Kathāsaritsāgara* nets are mentioned in the description of the hunting party of king Vikramasiṁha[9] and also are described as being laid in the glades by king Udayana.[10] Nets were used in hunting in the *Ṛgveda*[11] and are found in Kālidāsa.[12]

*Huntsmen*

The huntsmen usually accompanied the royal hunter specially if it was a regular hunting expedition. Thus we find kings Vikramasiṁha,[13] Udayana[14] and Candrāvaloka[15] accompanied by huntsmen. In Kālidāsa we find forest-surrounders.[16] In the *Kathāsaritsāgara* we notice that king Udayana, a great lover of hunting, used to station scouts in forest to watch and inform him about games.[17]

Footmen, mentioned in the hunting party of king Vikramasiṁha of the *Kathāsaritsāgara*,[18] are also found in the *Hammīra Mahākāvya*.[19] A great retinue of runners accompanying a hunting party is noticed in Bāṇa's *Kādambarī*.[20]

The royal hunter rode on an elephant, as we notice in the case of Candragupta Maurya. Megasthenes says that if the hunt took place in

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1 *Kss.*, XXVII, 150–157.
2 *Kss.*, XXI, 16.
3 *R.V.*, X, 86, 4.
4 Curtius, Bk., IX, Ch. I; *Classical Accounts of India*, p. 127.
5 *Raghu.*, IX, 46-47; *Sak.*, Act II.
6 *Hammīra Mahākāvya*, iv, 48.
7 *Mānasollāsa*, III-IV, 1298–1328.
8 *R.T.*, VI, 182.
9 *Kss.*, XXVII, 150–57.
10 *Kss.*, XXI, 16.
11 *R.V.*, IX, 83, 4; *A.V.*, VIII, 8, 5.
12 *Raghu.*, IX, 46-47.
13 *Kss.*, XXVII, 150.
14 *Kss.*, XXI, 11.
15 *Kss.*, XCIV, 8.
16 *Raghu.*, IX, 46-47; *Sak.*, Act II.
17 *Kss.*, XII, 5-6.
18 *Kss.*, XXVII, 150-51.
19 *Hammīra Mahākāvya*, IV, 48 f.
20 *Kādambari*, English Trans. by C. M. Ridding, p. 73.

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the open country the king rode on an elephant.[1] In the *Kathāsaritsāgara*, king Vikramasiṁha[2] and king Lakṣadatta,[3] while out on hunting, are described to have been seated on elephants.

*Ladies accompanying the royal hunting party*

In Megasthenes' description of Candragupta Maurya's hunting expedition, armed foreign female guards (Yavanīs) are found to be closely attending the royal hunter.[4] In Kālidāsa the king out on hunting was accompanied by 'Yavanīs' who were wearing garlands of flowers and were armed with bows and arrows.[5]

In the *Kathāsaritsāgara*, we find king Udayana going to Lāvānaka on hunting along with his queen Vāsavadattā.[6] Bilhana in his *Vikramāṅkadevacarita* has described the enjoyments of king Vikramāditya I in the cold season when the king accompanied by the ladies of his household started on his hunting excursion. He was preceded by courtesans on horse-back, while the inmates of his seraglio followed him on the rear.[7]

*Dress of the royal hunter*

Kālidāsa refers to hunting costume.[8] The royal hunter wore a leaf-coloured armour for the sake of the adaptation to environment.[9] *Kādambarī* refers to hunting costume.[10] In the *Kathāsaritsāgara*, king Udayana in a dark green vest, resembling the colour of the tree-leaves, ranged the forest which was of the same colour as his dress.[11] In the *Hammīra Mahākāvya* the footmen in the hunting party are dressed in blue clothes.[12]

*The games*

Lions, elephants, boars, buffaloes, deer and birds were the games in the Ṛgvedic days.[13] In Kālidāsa lions, tigers, wild boars, bisons, rhinoceroses, antelopes, yaks and birds are noticed as games in the description of royal hunts.[14] In the *Harṣacarita* we find Harṣa hunting lions, 'śarabhas', tigers and boars.[15] The *Kādambarī* mentions wild elephants, wild boars, lions, 'śarabhas',* yaks and many kinds of deer.[16] In the *Kathāsaritsāgara* the games consist of lions, tigers, elephants, wild boars, wild swine, buffaloes, deer and 'śarabhas'.[17] Jackal hunting finds some references in the *Rājataraṅginī*.[18]

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[1] Megasthenes, Fragm., XXVII.
[2] *Kss.*, XXVII, 152.
[3] *Kss.*, LIII, 15-16.
[4] Megasthenes, Fragm., XXVII.
[5] *Raghu.*, IX, 46-47; *Śak.*, Act II.
[6] *Kss.*, XV-XVI.
[7] Bilhana, *Vikramāṅkadevacarita*, XII, 50–78.
[8] *Śak.*, Act II.
[9] *Raghu.*, IX, 51–64.
[10] *Kādambarī*, English Trans. by C. M. Ridding, p. 73.
[11] *Kss.*, XXI, 11.
[12] Nayacandra Sūri, *Hammīra Mahākāvya*, IV, 48 f.
[13] *R.V.*, X, 28, 10; 86, 4; IX, 83, 4; X, 51, 6; V, 15, 3; 74, 4.
[14] *Raghu.*, IX, 51–64; *Śak.*, Act II.
[15] *Harṣacarita*, English Trans. by Cowell and Thomas, p. 132.
[16] *Kādambarī*, English Trans. by C. M. Ridding, p. 73.
[17] *Kss.*, XCIV, 8–14; XXI, 11–16; LXXV, 64–66; XXXV; LIII, 15–18; XLII, 2–7.
[18] *R.T.*, VI, 180–183; VII, 171; VIII, 699.

* 'Śarabha' is a fabulous animal supposed to have eight legs and to dwell in the snowy mountains. *Kādambarī*, English Trans. by C. M. Ridding, p. 73, f.n.

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## Hunting Recommended for Kings

In the *Kathāsaritsāgara*, Amaragupta, a minister of king Vikramasiṁha, tells the king that hunting is approved for the kings to give them exercise and excitement: the kings are further advised to slay the malignant wild animals, as otherwise the earth will be depopulated by them.[1] Recommendation of hunting for kings is found in *Kauṭilya*. The benefit of hunting, according to Kauṭilya, are exercise, getting rid of phlegm, bile, fat and a tendency to perspiration, practice in hitting the targets of moving and stationary bodies, knowledge of the minds of animals in anger, fear and ease, and occasional marching.[2] Similar views are noticed in Kālidāsa's *Śakuntalā*[3] and in *Kāmandakīya-nīti-sāra*.[4] Daṇḍin equally enthusiastic about hunting says there is nothing so nice as 'mṛgayā': it gives the legs magnificent exercise; and long winded speed might prove very handy after a defeat: it dries up the phlegmatic humour thus promoting digestion, the sole foundation of health: by reducing the fat it makes the body vigorous, sinewy, agile: it gives power to endure cold, heat, wind, rain, hunger, thirst: it interprets the mental activities of living beings from their physical expression: it supplements scanty crops with the flesh of deer, buffaloes, wild oxen and other games: it makes the land routes safe by killing such creatures as wolves and tigers: it wins the confidence of jungle tribes: it fosters energy, thus impressing hostile armies.[5]

In the early medieval work *Mānasollāsa*, hunting as a sport for kings, is elaborately dealt with. Thus, the text recommends the reservation of forest for royal hunt. Thirty-one methods of hunting are enumerated in this context.[6]

### *Hunting as a vice*

Along with the praise of hunting we also notice its condemnation in the *Kathāsaritsāgara*. Thus Amaragupta, the minister of king Vikramasiṁha, first recommending hunting for kings, adds that too much addiction to hunting is bad as formerly Pāṇḍu and other kings met their doom on account of it.[7] Hermit Nārada condemns hunting and repeats the story of Pāṇḍu whose love of hunting brought about his destruction.[8] In Kauṭilya too, hunting is one of the four vices and it is a worse vice than gambling. For, in it, the danger of robbers, enemies, wild animals, forest fires, and stumbling and loss of way as well as hunger and thirst constitute the danger to life.[9] Manu includes hunting in his list of ten vices.[10] Of these, hunting along with drinking, gambling and women forms a group of the four most harmful vices.[11] The condemnation of hunting for kings is to be noticed in the Kāmandakīya-nīti-sāra, which also says that calamities befell Pāṇḍu who was addicted to it.[12]

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1 *Kss.*, XXVII, 145–148.
2 *Arthaśāstra*, Bk. VIII, Ch. III, 46.
3 *Śak.*, II, 25.
4 *Kāmaṇḍakīya-nīti-sāra*, XIV, 25-26.
5 Daṇḍin, *Daśakumāracarita*, text, p. 135.
6 *Mānasollāsa*, Vol. II, 4th Viṁsati, Ch. 15.
7 *Kss.*, XXVII, 140–148.
8 *Kss.*, XXI, 17–30.
9 *Arthaśāstra*, Bk. VIII, Ch. III, 40.
10 *Manu.*, VII, 47.
11 *Manu*, VII, 50.
12 *Kāmaṇḍakīya-nīti-sāra*, I, 54.

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# SOME POST-MUSLIM TEMPLES AND SCULPTURES OF RĀJASTHĀN

By Adris Banerji

(*Received March 13, 1967*)

A most tragic age in India opened in A.D. 1193, when Turki converts to Islam crashed the gates and entered the fertile Kuru-Pāñcāla country. Beyond it, lay the smiling fields of Antarvedī (the doab between the Gaṅgā and Yamunā); and, even beyond these, all the populous cities, ports and emporiums of eastern India. They successfully exploited the gap to gain more. Since the Hūṇa invasion the Indian scene had changed. A policy of total indifference to the cataclysmic changes in the mainland of Asia isolated the rulers of India, who lived in an utopia of their own.[1] In this paper I am endeavouring to discuss some fanes of Rājasthān and their applied sculptures. Notwithstanding several successful Muslim raids, the number of temples amounts to more than 100 in Mewār alone.

After A.D. 1195, the socio-political scene underwent revolutionary changes. Over the rubble and shambles of their culture, small bands of Rajputs settled themselves in the inhospitable desert tracts and less accessible valleys of Rājasthān and western Himalayas, creating a new type of feudal society.[2] This society attempted not merely conservation, but resurrection of traditional arts and crafts. At first the resources were limited, the classic guilds and architects as well as stone-cutters (śilapaṭṭa *vaṁśa*, i.e. silāwat caste) were all lost. Their first attempts, therefore, were clumsy and crude, compared with the classic examples at Tārāgarh-Ajmere (and not Tārāgarh-Bundi), Ranthāmbhor, Bāḍoli, Menāl and Bijholyā. But later on they succeeded with Somapuras or Gujarāṭ craftsmen.

The chief characteristics of this architecture was beauty in mass—produced as an organic whole and not merely design in the abstract. The design had a functional character. A quality which could not have materialized without a well-established canon and a grammar for idioms of expression. The Somapuras with their canon have survived and were responsible for erection of the new temple of Somnāth. When in course of time the classic stage was reached, the creative faculty was lost, followed by inevitable conventionalization and copying. But some of the works of canon which have survived convey to us, across the gulf of ages, idioms and syntax of design. One of the factors that led to a moraine of critical appreciation is prejudice, like Lawrence, as evident from his evaluation of Indian art in *Jesting Pilate*. In fact the regional or national arts were merely varieties of universal sense of beauty and form according to ethnical capacities.[3] That is why Sir Jacob Epstien was so much impressed by Negro art.

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[1] *Cf.* the writer's 'Post-Muslim Temples of Bihar'. *JAS*, Vol. IV, No. 2 (1962), pp. 63 ff.

[2] P. Saran: *Studies in Mediaeval History of India*. New Delhi, 1932.

[3] *Cf.* the writer's 'The Character of Indian Art'. *Calcutta Review*, April 1937, pp. 85 ff.



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From its very origin and development, architects of ancient India, and later on of mediaeval Rājasthān, depended on mass for stability without any mortar. They joined together a number of isolated forms to obtain the results, that is, to counteract gravitation with balance and poise. Elegance, extraordinary in quality, was obtained by exploiting forms, geometrical and vegetal motifs, sculptures and pilasters, etc., in a sculpturesque way. The richness of the decorative art conveys a sense of well-being, grandeur and delight. They possess character and significance, based upon assimilation of cultural influences both from the north and south. They are distinguished by breadth of vision, imagination and a balance between verticals and the horizontals of the design, solids and voids. The niches on the outer wall played a vital role in breaking up the monotony of the same plain, at the same time imparting a unity to the whole design. Yet, this very design had mystic, sacerdotal and spiritual values. They betray the existence of a cognate and homogeneous style and are examples of a distinctive and concerned architectural movement, differing only in expression.

The first of these are three Jaina temples and one shrine dedicated to the Sun at Raṇpura, Rāṇakpura or Rāmpūrvā (25° 7′ N and 73° 28′ E). It is celebrated as one of the *pañcatīrthas* of the Jainas. The place is situated 88 miles south-east of Jodhpur city, and 14 miles east by south-east of the Falnā railway station. It had been noticed by Fergusson and an account of the monuments of this place was first published by D. R. Bhandarkar, as Assistant Superintendent of Archaeological Survey, when it possessed scholars and not matriculate overseers on regional or technical grounds. He further elaborated his studies on the Sarvotabhadra temple called Yugādīśvara in the consolidated *Report* edited by the late Sir J. H. Marshall.[1] The Sarvotabhadra temple is well known, but the fact that there are two other temples dedicated to Supārśvanātha, the 7th *tīrthaṅkara*, and Naminātha, the 22nd *tīrthaṅkara*, is not so well known. These two temples are at the front of the great temple. Notwithstanding the fact that Rājasthān was an area of great isolation,[2] most of the remains have undergone structural repairs, due to vandalism; and many earlier remains have totally disappeared. The temples under discussion erected on a lonely glen, which gives access to the western slope of the Aravalli range, were no exceptions; and local tradition refers to a visit by Aurangzebe. Leaving aside these folk-traditions, the fact remains that the objective evidence supplied by the structures themselves establishes possibility of destruction. But as far as dates are concerned except in one example we have no data to proceed objectively. For the rest we have to be subjective, depending on style. The Yugādīśvara temple, according to an inscription, was erected in V.S. 1489 (A.D. 1432-33), during the reign of Mahārāṇā Kumbhakarṇa. It was a *miśra* type of temple, as far as materials are concerned. The *śikharas* were built of brick. Stylistically, they are of Lāṭa variety, that is, clustered *śikhara* types of Gujarāṭ, but extremely inelegant.

The two minor Jaina temples were of *nirandhāra* type, that is, without any circumbulatory passage within the temple. Several periods of structural sequence exist in the temple dedicated to Supārśvanātha, the tower

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[1] *A History of Indian and Eastern Architecture*, *Progress Report of the Archaeological Survey, Western Circle*, 1907-08, pp. 58-59; *Annual Report of the Archaeological Survey of India*, 1907-08, pp. 205-06. *Cf.* also the writer's 'Jain Temple at Rāṇakpur'. *Journal of Indian Museums*, Vols. XVII–XX (1961–64), pp. 41–45.

[2] B. Subba Rao: *The Personality of India*, 1958, p. 12.

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excluding minor repairs and the *garbhagṛhá* up to *śukanāsā* belongs to *c.* fifteenth or sixteenth century A.D.; while the peristyled veranda with hypostyle roof of the *antarāla* was erected in the nineteenth century (Fig. 1). This dating of the older portion is supported by the quality of sculptures as well as the *saṁsthānaka*. The sanctum is rectangular internally, but star-shaped (*vṛtta*) externally, with *rathas* (projecting angles), *chaturbhadras* (four facets) and *salilāntaras* (recessed corners). The two temples at Nemāwār Chaubera Dera, Nos. 1 and 2, and Nīlkaṇṭheśvara at Uṇ (district Dewas), the temple of Udayeśvara at Udaipur (district Vidiśā) are few of this class. Further additions can be made from Menāl and Bijholyā (in districts of Bhilwārā and Chitorgarh) which were also repaired in post-Muslim times: possibly by Mokala or Kumbha.

The applied sculptures, too, have great affinity not merely in style with those of the great Sarvotabhadra cathedral but also with those of Kumbha's Tower of Victory at Chitorgarh and Śṛṅgāra Caurī at the same place, as far as presentation, spirit, sensibility and vitality are concerned. From a bygone past are inherited the decorative motifs or they were copied from existing ruins. A great deal of this revival was due to the researches of Maṇḍana Miśra. Vegetal and geometrical ornaments, harmless to the tenets of Islam, had been utilized by Indian craftsmen in occupied India since the twelfth century of the Christian era. But with a difference. Abstraction, formalization and idealized human forms are noteworthy. Many of them are copies of existing sculptures, in fact the idea of an archtype is forced upon us. The same arrangement within *kuṭas* (shrines flanked by pilasters), or *piṭhas* (pedestals) of *apsarās* or *surasundarīs* in various poses and postures (Fig. 3); playing flutes and *mṛdaṅgas*, dancing, holding mirrors or applying vermilion on the parting of the hair, juggling with balls, *mithuna* couples, *siddhas*, *yakshas*, *kīrttimukhas* are found in diluvian quantity as used to be done before the Turki invasion, from Comorin to Rājasthān.

Idioms of architectural expressions are also conventional. We have the same *jālaka* of *caityas*, *jāḍyā-kumbhas*, *karṇikā*, *grāsapaṭṭi*, *antarapatra*, *kapota* and *kumuda cāḍyās*, etc., as plinth-mouldings. Above the *varaṇḍikā*, we have the identical *rathikā*, *tilaka*, *karṇaśṛṅgas*, *bhūmi-āmalakas*, etc. The doorways have *mandāraka*, various kinds of *śākhās* such as *gandharva*, *patra*, *vyālaka*, etc., *lalāṭavimba* and *uttarāṅga*. The excellent quality of the ornaments and the admitted sculpturesque nature of architecture are the best epitaphs on this revival movement. Along with these, an intruding element, alien to the national traditions, also appear; suggesting assimilation and absorption of Turco-Afghan architectural expressions. These are the domes—most delicately carved filigree works, interlaced at that, reminding us of similar examples in Gujarāt, inherited from a past they had destroyed by the sword and fire, e.g. at Modherā. Many of the motifs and designs on pillars, *taraṅgapotikās* (roll brackets), *pratolis* are met with in Muslim buildings.

The temple of Naminātha is similar to that of Supārśvanātha.

The third temple, however, was dedicated to the Sun and stands in a different footing. It has a *jagati* and *adhiṣṭhāna*. This was also a *niran-dhāra prāsāda*, too. Originally it contained a *saṁvṛtta maṇḍapa*, an *antarāla* and a *garbhagṛha*, which was rectangular internally and *vṛtta-saṁsthānaka* externally. The roofs of the passage and the porch have fallen but the *śikhara* stands. The ornate doorway (Fig. 4), without the iconostasis of the twin river goddesses, Gaṅgā and Yamunā, with a high threshold, *dvārapālas* and the *urdhhapaṭṭikā* having the effigy of Gaṇeśa on *lalāṭavimba*, along with the figures of the *parivāradevatās*, *dikpālas* and *navagrahas* (Fig. 5), etc., on the outer walls of the *garbhagṛha* or *vimāna*



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belong to c. eleventh or twelfth century A.D. But the *varaṇḍikā* with *grīvā*, *mastaka* are of c. A.D. 1400–1500. The *śukanāsā* has a vacant *piṭha* or pedestal. No doubt all the elements of the design of the *varaṇḍikā* are there, e.g. the *mula-mañjarī*, *aṇḍaka*, *ura-mañjarīs*, flanked by *karṇa-mañjarīs*, *karṇa* and *naṣṭa-śriṅgas*. But they lack the grace, the mass, the elegance, the compactness and what is more, concord in design of its earlier and classical prototypes. The rhythmic cascades of planes, from which the *mūla-śikhara* raises its massive body, silhouetted against the sky, are conspicuous by their absence. Yet, it has similarity with those of the Yugādiśvara temple. All these show that it underwent repairs in the fifteenth or sixteenth century A.D., having fallen into ruins or violated. Then again it suffered desecration or fell into ruins in troublous times that followed, and has never been repaired.

A remarkable departure in the temple of Supārśvanātha is the occurrence of erotic sculptures (Fig. 6). A very well-known practice with the ancient and mediaeval *sthapatis*. These are a source of great embarrassment to the Jaina priests of Rāṇakpura, who explain that the temple was erected by the Somapuras, who built the Sarvotabhadra temple, during their leisure hours. The term Somapura is very helpful, since it establishes the role played by the Gujarāṭ craftsmen in reviving art and architecture in South-eastern Rājasthān in the fifteenth century of the Christian era. Even now they are employed in the annual repairs. In passing we must point out that the erotic scenes, far from being lecherous, have an intellectual quality, which elevate them from commonplace voluptuousness. Their spirituality eclipses banality.

The temple of Naminātha has no erotic sculptures but possesses the identical *apsarās* or *surasundarīs* on *piṭhas* (Fig. 7), rampant *vyālakas* on the *salilāntaras* and the images of *dikpālas*, etc. (Fig. 8). The applied sculptures have value of their own. They are distinguished by polish, rather than untutored vigour. They have a distinct individuality, as portraits of souls within limits of personality. The art was conceptual rather than optical. What is more, they betray a knowledge of what a great ally the Sun was. The earliest instances of this utilization of the solar rays are Bhārhut and Sānchi. The next great instance is the Tower of Dhāmek at Sārnāth, where every facet was carved with a view to obtaining greatest effect of the solar rays during various seasons and different hours of a day. In the same way, the forest of sculptured reliefs of Rāṇakpur is thrown into highest relief in the earlier part of the day. The noonday Sun, blazing in all its glory creates transcendental forms and chiaroscuro. The afternoon glow accentuates the edges with a vivid sidelight—a living series of figures in guilded stone, relieved by crisp blue shadows, below the seemingly lofty *śikharas*, silhouetted against the blue of the space.

The form and proportions, derived from nature, have been successfully transformed in stone. The anthropomorphic renderings of the celestial forms, the lovely figures of the resplendant females, in the most common day-to-day poses—reaching upwards at the parting of the hair (Fig. 9) on the head; holding a mirror; dancing with a dagger or juggling with balls (Fig. 10)—indicate the humanism of the art. Their shapely arms, outlines of jewelled girdled thighs, rounded legs and small but full busts are fore-runners of mediaeval Rājasthāni paintings. The decorative and the realistic factors are most happily co-ordinated with symbolic motifs and flowers. The dancers burst upon our vision stamping joyously earthwards, with the daring conceit of youth. One foot is firmly advanced or placed with prehensile strength, while the other foot is carefully held for balance. In none of these poses, any arrogance, immodesty or false sense or timidity are



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observed, but they are remarkable for serene frankness, honest charm and simplicity of sylvan nymphs. At the same time there is majesty, nobility and expressive contours and angles. They represent, in material terms, the image of eternal women and eternal beauty, which lies dormant in human hearts. Over all these the Sun lays a carpet of gold. The eternal spirit is one, though the learned may call it by various attributes.

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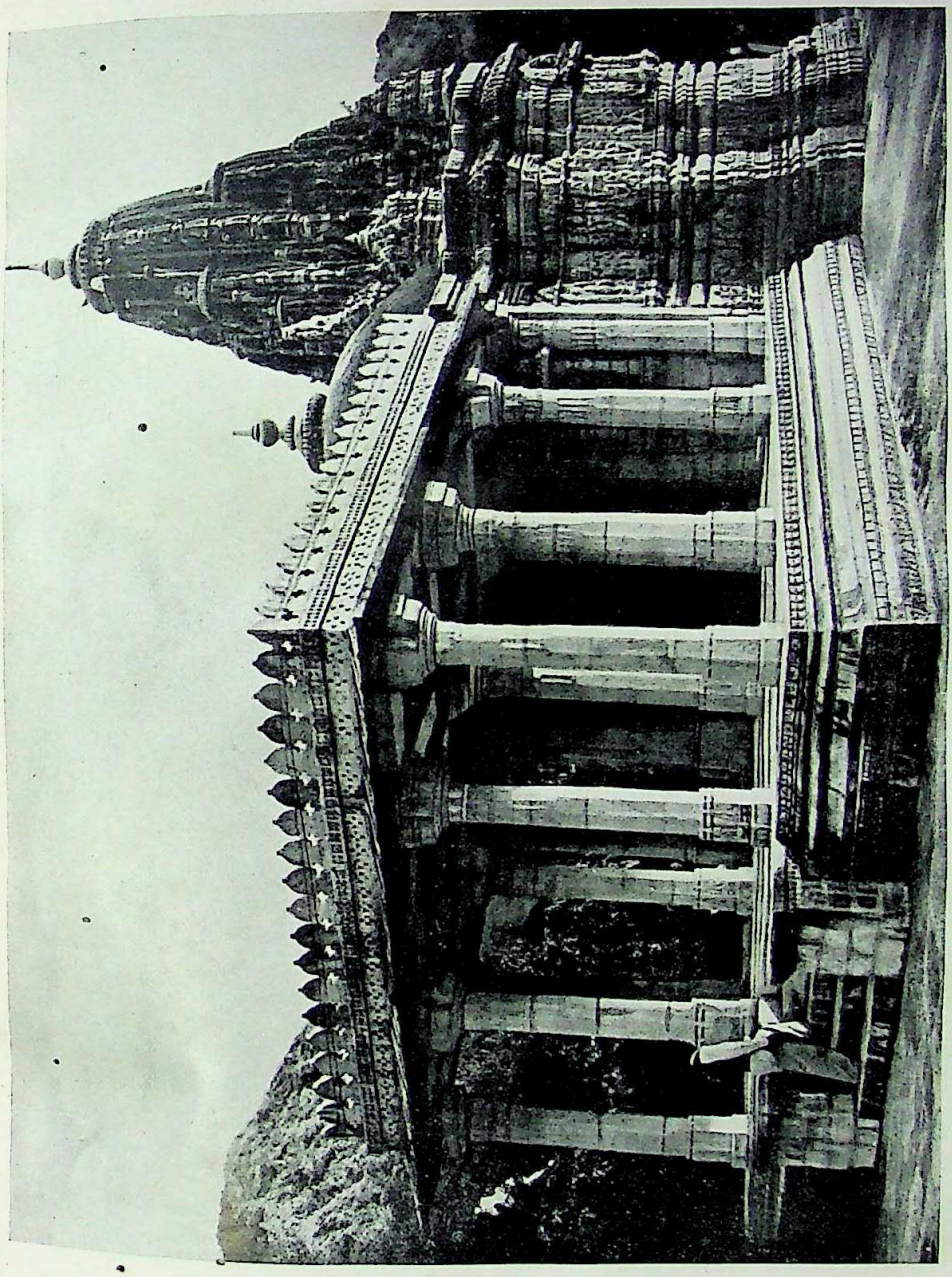

FIG. 1. The temple of Supārśvanātha at Rānakpur, Dt. Bārmer, Rājasthān.

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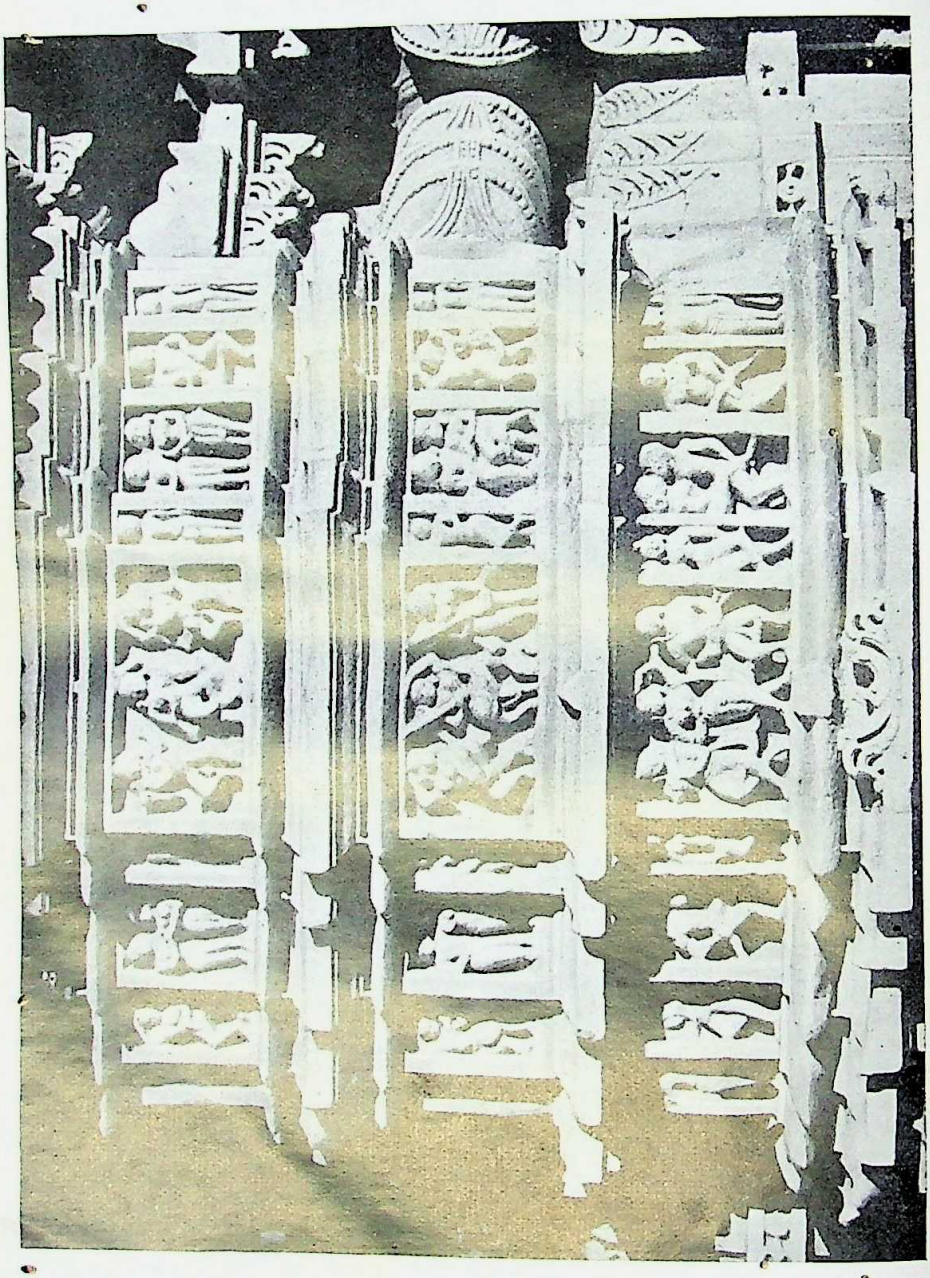

FIG. 2. A sculptured *bhadra* of Supārśvanātha temple, Rāṇakpur.

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FIG. 3. *Apsarās* in various poses on *pīṭhas* of Supārśvanātha temple, Rāṇakpur.

FIG. 2. A sculptured *bhadra* of Supārśvanātha temple, Rāṇakpur.

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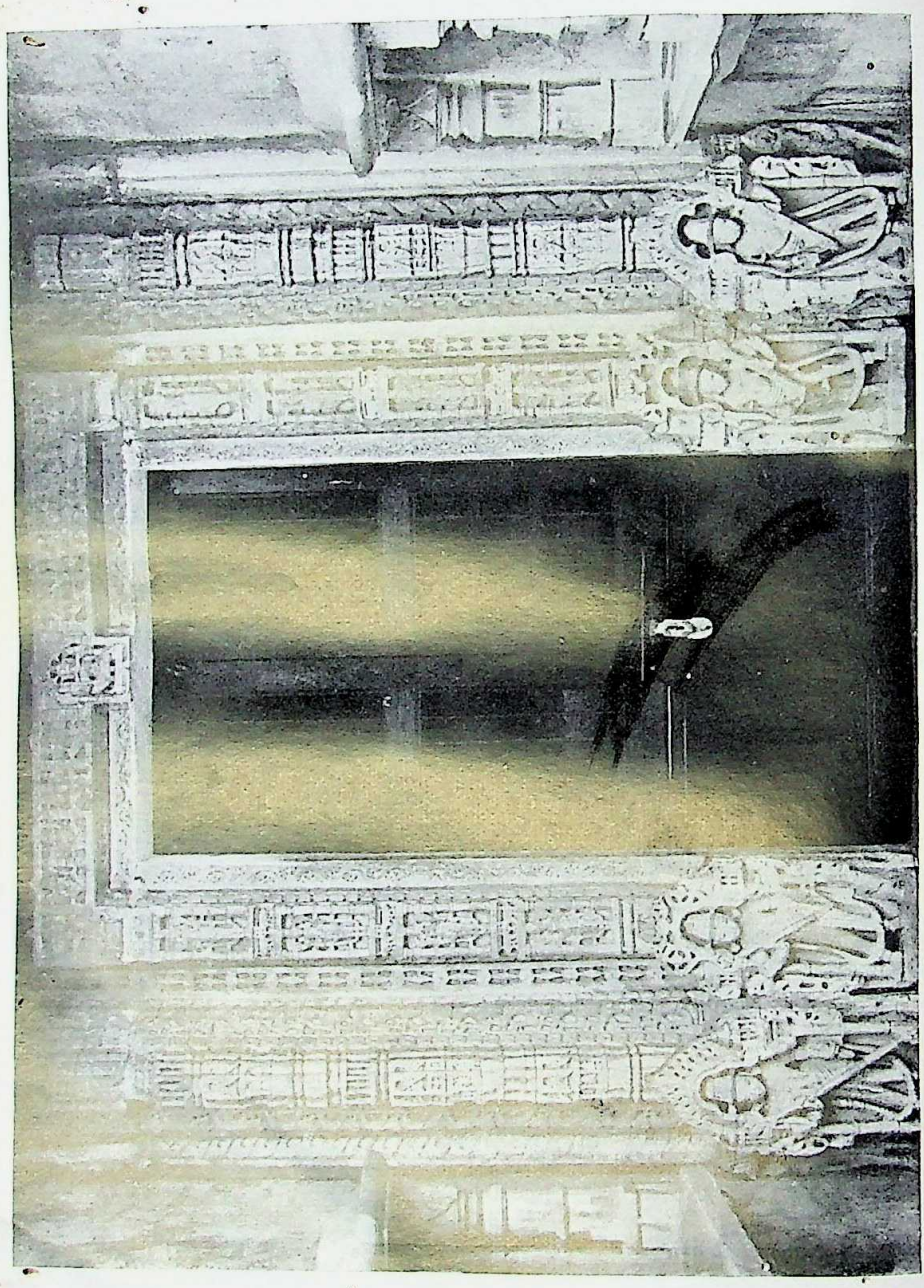

FIG. 4. Doorframe of the sanctum of the Sūrya temple at Rāṇakpur.

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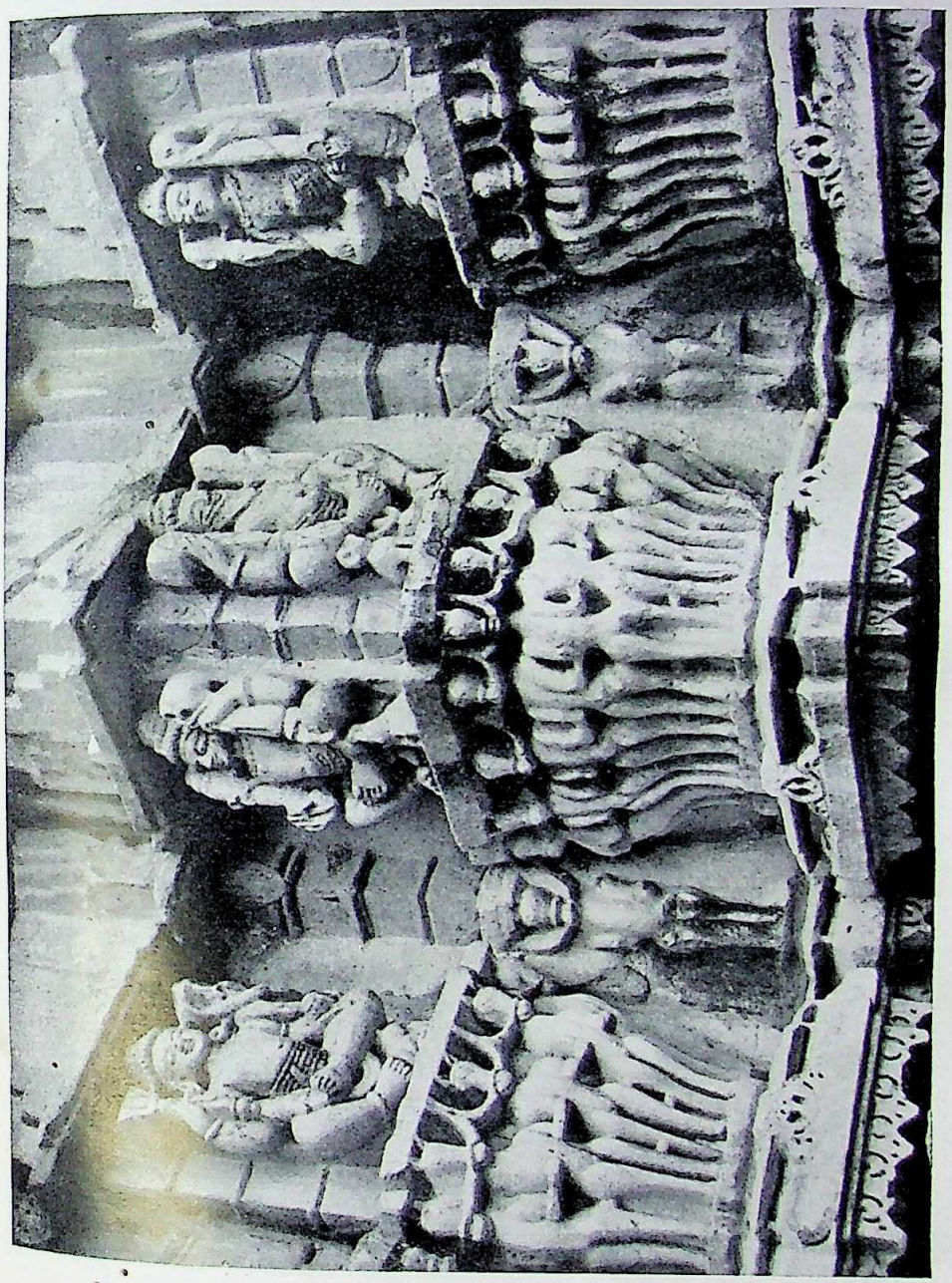

FIG. 5. Images of *dikpālas* on *rathas* of the Sun temple, Rāṇakpur.

FIG. 4. Doorframe of the sanctum of the Sūrya temple at Rāṇakpur.

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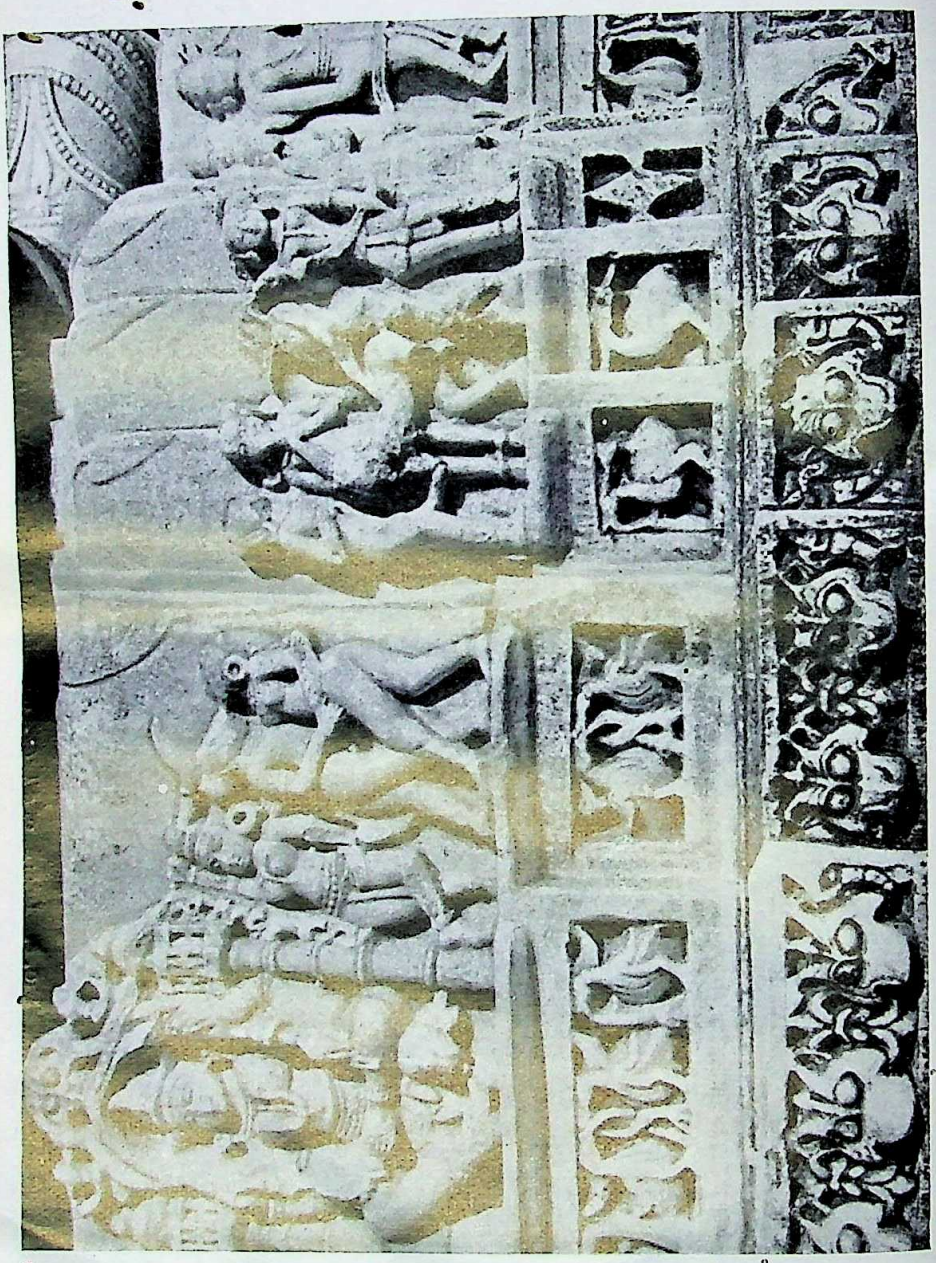

FIG. 6. *Mithuna* couples, *hainsalilās*, above *kīrttimukhas* of Supārśvanātha temple.

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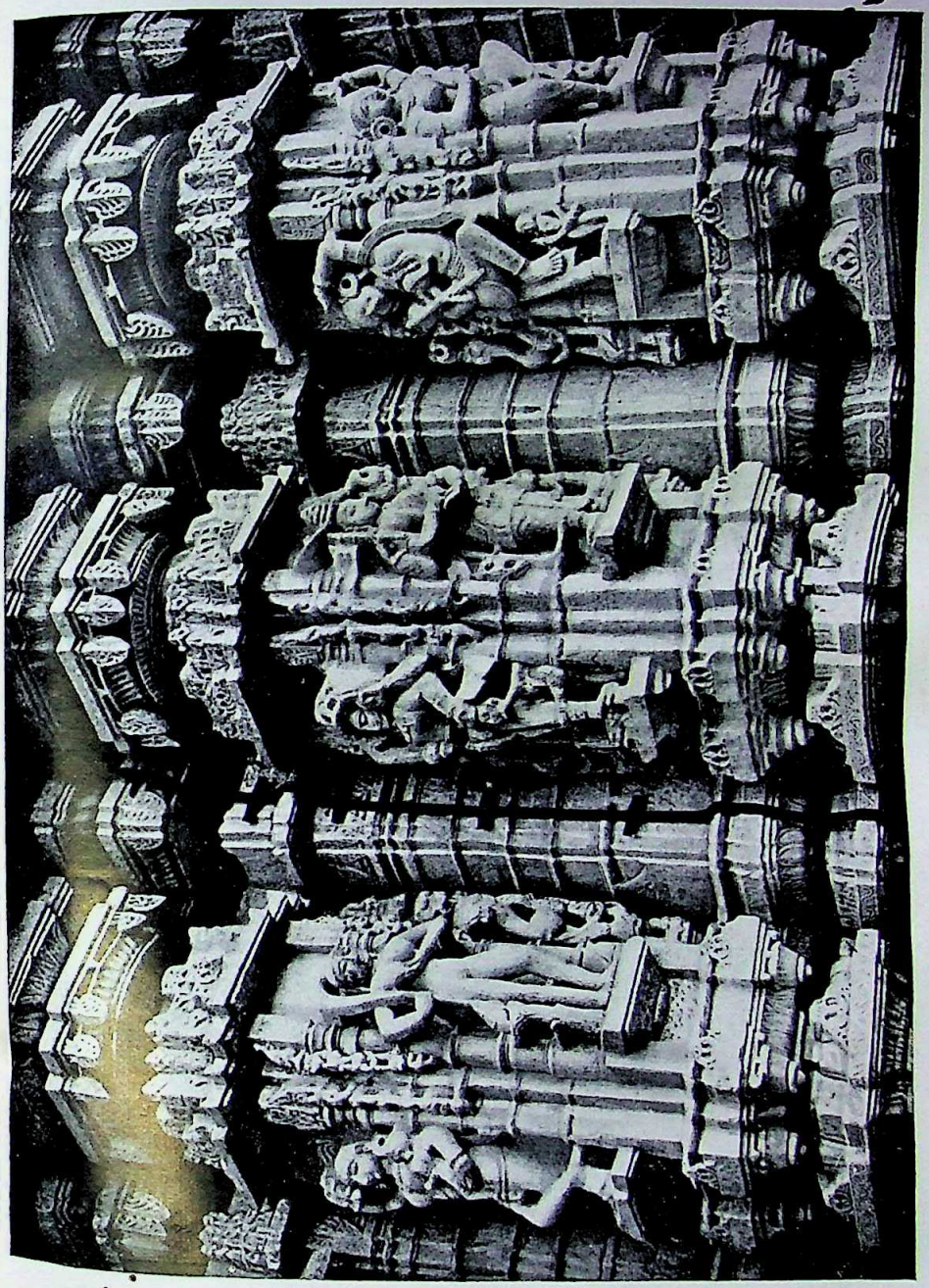

FIG. 7. *Surasundarīs* on *pīṭhas* in various poses, Naminātha temple, Rāṇakpur.

FIG. 6. *Mithuna* couples, *haṁsalīlās*, above *kīrttimukhas* of Supārśvanātha temple.

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FIG. 8. Images of Indra, Agni, etc., in *kuṭas*, Naminātha temple

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FIG. 9. A woman looking at a mirror, etc., Supārśvanātha temple, Rāṇakpur.

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FIG. 10. Juggling with balls, Supārśvanātha temple.

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# REFLECTIONS OF ANCIENT INDIAN SOCIETY IN THE KATHĀSARITSĀGARA

By APARNA CHATTOPADHYAY

(*Received January 5, 1967*)

The Kathāsaritsāgara though often referred to by scholars as a work of the early medieval period inasmuch as it was written by Somadeva in the eleventh century, the period which it depicts, has been a subject of controversy. Though one of the richest fields for social research, being next to the two epics in this matter, Somadeva's Kathāsaritsāgara is a stupendous collection of tales dating from very early days up-till the Vetala Pancaviṁśati and the Pañcatantra were incorporated in it and is based on Guṇāḍhya's Bṛhatkathā.

By a critical study of the material found in the work, we can say that the work, in spite of it being a very large collection of tales dating from the earliest years of Aryan society, generally depicts early medieval Indian society, though there are some details which belong to the earlier period of Indian society while some others are true to ancient Indian society in general.

In the first place we trace the details, in the Kathāsaritsāgara, that prove its colouring of the early medieval period. We find Rājputs mentioned in several places. Though the Sanskrit term for Rajput is Rajaputra which may mean a prince, the context of the references shows that they were Rajputs. Thus we find a Rājaputra named Siṁhagupta in the service of king Sātavāhana[1] and the capital city of Ujjayinī guarded by Rājaputra guards.[2] In these references the term Rājaputra suggests men of the Rājput community and not princes. The appointment of five hundred Rājaputra bodyguards for prince Samarabhaṭa[3] or two hundred Rājaputra guards accompanying Vikramāditya[4] also suggest the same. Again we find that a Rājaputra named Kṛṣṇaśakti came from the Deccan and took service under king Vikramāditya. He had along with him five hundred Rājaputras.[5]

In the field of education we find monasteries for Brāhmaṇas in the Kathāsaritsāgara. It refers to the monasteries of Brāhmaṇas in Ujjayinī,[6] in the city of Karkoṭaka[7] and in the island of Utsthala.[8] In Kṣemendra's Deśopadeśa we find interesting and intimate details about a Hindu 'maṭha' in Kaśmīra with students from distant Bengal.[9] In the Rājataraṅgiṇī we find many references to such 'maṭhas' which were centres of learning. Such 'maṭhas' were built in large numbers in Kaśmīra by kings, queens, princesses and ministers and also by virtuous citizens.[10] Kalacuri and

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[1] *KSS.*, VI, 155.

[2] प्रवीरकुलजानेकराजपुत्राभिरक्षितैः *KSS.*, CII, 11.

[3] *KSS.*, LXXIV, 59.

[4] *KSS.*, XXXVIII, 17-18.

[5] शिश्रिये राजपुत्राणामन्वितः पञ्चभि शतैः। *KSS.*, CXXIV, 52-53.

[6] *KSS.*, XVIII, 105.

[7] *KSS.*, XVIII, 318.

[8] *KSS.*, XXV, 63.

[9] *Deśopadeśa*, Lesson IV.

[10] *R.T.*, VII, 214; VIII, 243, 2401, 3320-21; VII, 151, 182-83, 956; VIII, 246, 371, 1052, 2309, 2333-34; VIII, 120, 5111, 2408, 2402, 2431, 3354, 3355-56, 3359; VIII, 3330.



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Cāḷukya kings also established 'maṭhas' for promotion of learning.[1] Here we may note that, as rightly pointed out by Professor Basham, Hindu monasticism developed in the middle ages and the 'maṭhas' of the Hindu orders also became centres of learning.[2]

Secondly, in the Kathāsaritsāgara, we find Valabhi as a centre of learning.[3] Valabhi, a Buddhist centre of learning like Nālandā, acquired this reputation by the seventh century A.D. In earlier days, it was a great centre of trade but not of learning.[4] The absence of Buddhist monasteries as centres of learning in the Kathāsaritsāgara is also a feature of early medieval India. Further, Somadeva does not mention Takṣaśīlā of Vārāṇasī as centres of learning. In early years Vārāṇasī was a great centre of learning while in a later period it became famous as a religious centre.[5] The later picture of Vārāṇasī, which is true to early medieval period, is to be found in the Kathāsaritsāgara.

The wide prevalence of the custom of 'Satī', as found in the Kathāsaritsāgara, attests its early medieval character.[6] Before the sixth century A.D., it was rare and by the time of the Muslim conquest it was well established in society as one of the two courses left to Indian widows, the other being the miserable lonely life of a widow with all the hardships.[7]

The institution of 'Devadāsīs' or temple girls referred to by Somadeva in a matter-of-fact[8] tone again reflects medieval Indian society in the Kathāsaritsāgara. This institution is totally absent in Indian literature, Dharmaśāstras and inscriptions before the sixth century A.D.[9] Its sudden emergence in the framework of Indian social and religious life is a mystery and a puzzle for students of Indian social history. Any piece of literature mentioning 'Devadāsīs' as a regular feature of society shows its early medieval character.

The practice of taking women of easy or doubtful virtues as wives, which is found in the Kathāsaritsāgara in the case of Anaṅgaprabhā[10] and is corroborated by the Rājataraṅgiṇī,[11] portrays the society of early medieval India.

Some instances[12] of the re-marriage of widows as found in the Kathāsaritsāgara may apparently suggest that they depict the society of an earlier period. But a critical examination of these instances shows that they do not represent the general condition of the widows of the early medieval period. The instances are of Mālava, Pauṇḍravardhana and Karkoṭaka (most probably Arakan[13] according to Tawney).

In the field of religion we find Puranic Hinduism firmly established in society with Vedic sacrifices lingering and Buddhism gone to the background. This again depicts the religious condition of the early medieval period. The regard for the Buddha and his teachings, especially for his ideal of self-sacrifice for the good of others, along with the contempt for

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[13] C. H. Tawney, *Ocean of Stories*, Vol. I, p. 136.

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Buddhist female ascetics, again proves the early medieval character of the cultural data in the Kathāsaritsāgara. The practice of singing hymns before the deities, an early medieval practice, is also a noticeable feature of the religious life in the Kathāsaritsāgara.

Vadrikāśrama and Kaṅkhal, the two[1] holy places for pilgrimage as mentioned in the Kathāsaritsāgara, were holy places since the early medieval period. The mention of these two again makes the work sociologically true to the early medieval India.

In matters of food and drink we find the practice of meat-eating widely prevalent. Though we do not know if the statement of Fa-hsien that among upper classes meat-eating was not the practice is true to a certain extent (it being a result of the propagation and predominance of Buddhism since the days of Aśoka up to the time of Kaniṣka), the wide practice of meat-eating as found in the Kathāsaritsāgara[2] is in conformity with the picture given by Hsüan-tsang[3] and other subsequent sources.[4]

The great belief in astrological predictions based on the study of planets, as found in the Kathāsaritsāgara, is also an early medieval Indian feature. It was by the time of Varāhamihira that Indian astrology came to be closely connected with astronomy. The future and fate of man began to be studied in the light of the nature of the planets under which he was born. Before this, fortune-telling was based on the study of auspicious and inauspicious marks on the limbs of the person and other physiological signs.[5] In the Kathāsaritsāgara we find the former practice firmly established in society. Though marks of limbs were also studied, the serious decisions of life as regards marriage, etc., were made by the study of the stars of the person.[6] Finally, in political life, we find fatalism well established in Somadeva's Kathāsaritsāgara and it is a marked feature of early medieval India.

We, however, can trace a few points which are true to the earlier period. Thus the instances of the pure type of Rākṣasa and Gāndharva marriages found in the Kathāsaritsāgara[7] cannot be called true to early medieval India. No mention of Kanauj as a big and capital city of India and frequent mention of Pāṭaliputra, Ujjayinī, etc., also depict an earlier society. The stories of the Kathāsaritsāgara, being borrowed from earlier sources, naturally contain traces here and there of bygone days.

On the other hand, some social features of unbroken continuity since the Vedic days up-till the Muslim period are also traceable in the Kathāsaritsāgara. But these cannot be used as arguments to hold that the Kathāsaritsāgara does not depict the society of early medieval India. Thus, we find Brāhmaṇas taking to the profession of Kṣatriyas, a practice as much true to earlier years as to the early medieval age. Secondly,

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[2] *KSS.*, XXX, 97; VIII, 23-24; LXI, 282–84; LVI, 188; XXII, 128; LIV, 170-71; LXXX, 21; LXXIII, 246; LXXXIII, 24; VIII, 23-24.

[3] S. Beal, *Buddhist Records of the Western World*, Vol. II, p. 143.

[4] Kṣemendra, *Deśopadeśa*, Lesson VI, 28, Lesson XI, 32; *Narmamālā*, Satire III, 68; *Samayamātṛkā*, II, 22; *R.T.*, VIII, 676, 1866-67, 285–89. Al Bīrūnī, *Sachau*, Vol. II, p. 151.

[5] A. L. Basham, *The Wonder that was India*, pp. 489-90.

[6] *KSS.*, CI, 118-19.

[7] *KSS.*, XLIV–L; III, 60–67; X, 146; VI, 13–15; LXXV, 131; LXXXVI, 113; VII, 82.

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inter-caste marriages specially of 'anuloma' type as found in the Kathāsaritsāgara are true to the entire Hindu period. The fine and accomplished class of public women as seen in the Kathāsaritsāgara are found in the Indian society since the years of the Buddha who was kind to the illustrious courtesan Ambapāli. The miserable lot of the widows and the existence of female ascetics are two more features found in the Kathāsaritsāgara which are true to the ancient period in general. The practice of rice-eating and drinking wine, the practice of wearing ornaments by males and decorating themselves with flowers and with sandalwood ointment, the social vice of gambling and the popularity of hunting with royalties as a pastime, the practice of making fine floral decoration on limbs with sandal-wood paste by women and of adorning themselves with flowers, the belief in magic, witchcraft and in the existence of semi-divine beings like Asuras and Rākṣasas, etc., all these, as found in the Kathāsaritsāgara, are true to the whole of the ancient period and not particularly to early medieval India.

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# CONTRIBUTIONS TO OUR KNOWLEDGE OF INDIAN FRESHWATER PLANTS

## 5. On the morphology, reproduction and autecology of *Pistia stratiotes* Linn.*

By Eva Mitra

### Introduction

*Pistia stratiotes* Linn. is widely distributed throughout the warmer parts of the plains of India. Valuable information of various aspects of the species are mentioned in the works of Roxburgh (1832), Griffith (1851), Engler and Prantl (1889), Hooker (1894), Campbell (1900–1905), Prain (1903, reprinted edition 1963), Arber (1920), Haines (1922), Eames and MacDaniels (1925, revised edition 1959), Hutchinson (1926), Coulter and Cowles (1931), Hutchinson and Dalziel (1931–1936), Lawrence (1951), Biswas (1954) and others. In this article the habit, external and internal morphology, reproduction, some experimental studies on the behaviour of the different vegetative parts and some physico-chemical conditions of existence of *Pistia stratiotes* have been dealt with in detail. This study has a direct bearing on the problem of weed control, as the means of control of any weed can be suggested only after knowing the details of the morphology and ecology of the species concerned.

### Habit

*Pistia stratiotes* belongs to the family Araceae. It is a free-floating, gregarious stoloniferous herb (Fig. 1). Each plant has a small tuber with a cup-like cluster of leaves on the upper side and a bunch of thread-like adventitious roots on the lower side. During the monsoon when the ponds overflow, the free-floating plants are carried far and wide to the adjoining river or ponds, canals and even find their way to surrounding marshy lands. After the rains when the water subsides the plants get stranded in the waterlogged, marshy land and in the hot weather when the areas dry up the plants also dry up. But if in this dry state they are carried to other tanks, or by some means they come in contact with water, they rejuvenate and grow up again under favourable conditions.

### Morphology

*Tuber*

The mature tubers, which remain partially submerged, are quite small in size generally varying between 7·0 and 15·0 mm. in length. The basal part of each mature tuber has the marks of the whorls of the fallen leaves and the apical side of the tuber bears the cup-like leaf whorls (Fig. 2). The roots develop on the tubers from the base of the last foliage whorl. The runners come out from the axils of some leaves and project into the water (Fig. 3). Multicellular hairs are present on the lower side of mature tubers.

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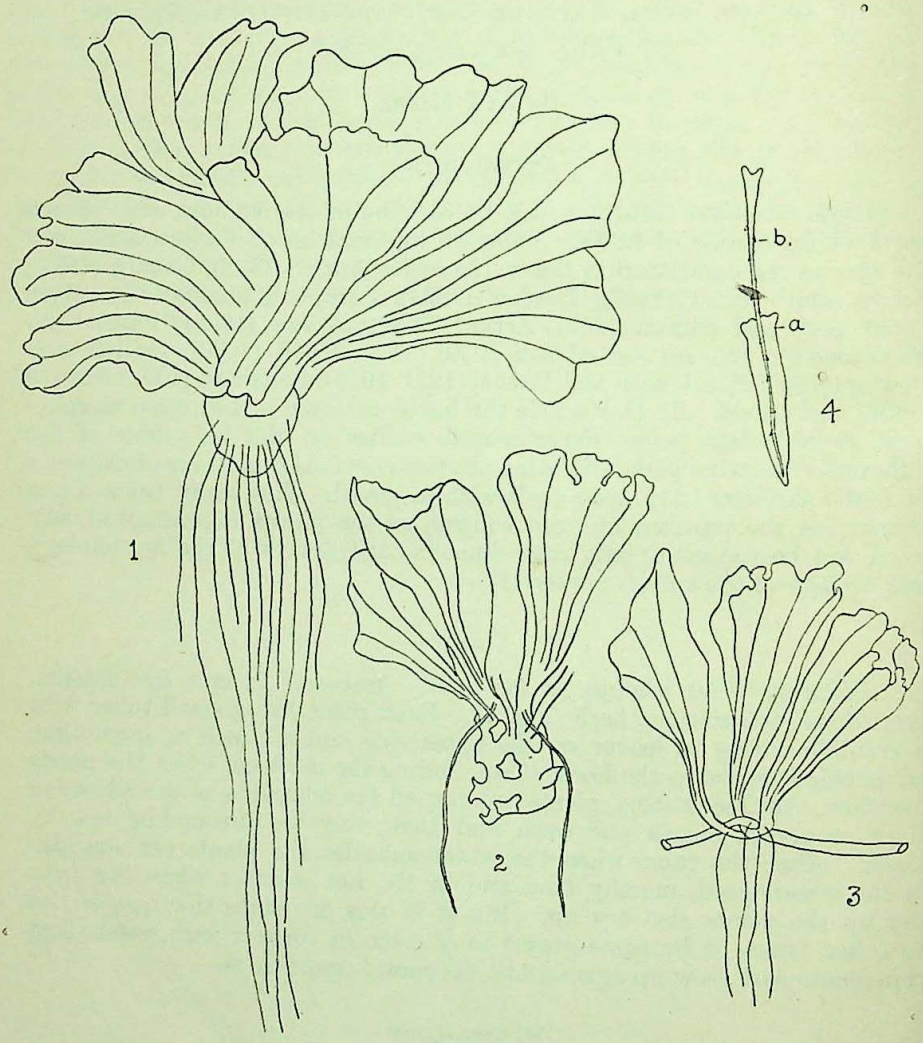
*Roots*

The roots develop in thick clusters from the base of the lowermost whorl of foliage leaves. The tips of the roots are protected by root pockets which are longer and more conspicuous than the rootcaps of the soil roots. Root hairs are few and not much prominent (Fig. 4).




FIGS. 1 to 4. 1, *Pistia stratiotes*, plant nat. size; 2, plant showing the marks of fallen leaf whorls on the basal side of the tuber, nat. size; 3, axillary development of runners, nat. size; 4, root, ×10; (4*a*), root pocket, (4*b*), root hairs.

*Leaves*

Leaves are arranged in close spiral around the apical part of the tuber. Each leaf is sessile, obovate-cuneate, entire with veins varying from 5 to 7 in number. Leaves are fleshy in texture with abundant hairs on the ventral surface. The vernation is involute (Fig. 5*a*). Gradually with the growth of the leaf, the lamina unrolls and extends to form the fully developed foliage (Fig. 5, *b–d*). Stomata are commonly present on the lower side

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of each leaf (Fig. 5*e*). The structure of stomata is very simple. The stomatal pore is enclosed by two kidney-shaped guard cells, one on each side. As in most hydrophytes, here also, the inner cutin ridges of the guard cells are lacking.

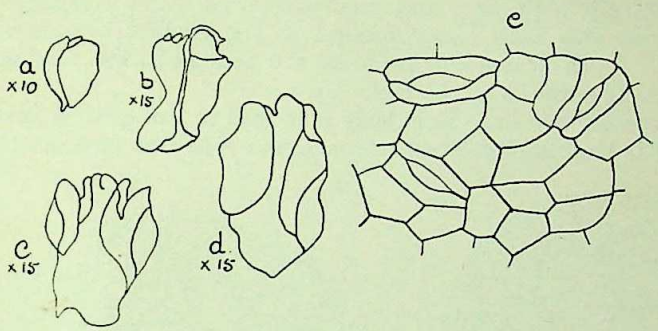


FIG. 5*a–e*. (*a*) leaf vernation; (*b–d*) opening of leaf from the bud stage; (*e*) stomata.

## ANATOMY

*Tuber*

In transverse section it shows the following features (Fig. 6*a*):

*Epidermis.*—One-layered, parenchymatous cells but without any thickening on the outer wall.

*Ground tissue.*—Composed of irregular, parenchyma cells with air-chambers scattered all over. The airchambers have thin, one-celled diaphragms enclosing large airspaces. These diaphragms prevent the entire airchamber system from flooding when a part of the vegetative body is injured. Within these airchambers needle-shaped calcium oxalate crystals are present in cone-like bundles, these are known as raphides (Fig. 6*f*). Within the airspaces another type of star-shaped, globose crystals are present which are known as druses (Fig. 6*e*). Both the raphides and the druses provide mechanical support as well as protection against aquatic animals.

*Vascular bundles.*—Scattered all over the ground tissue. Each bundle is composed of one central vascular element surrounded by a few layers of small, closely set undifferentiated cells forming the conductive tissue.

*Runner*

In transverre section (Fig. 6*b*) and in longitudinal section (Fig. 6*c*) it shows the following features:

*Epidermis.*—Single-layered, small, regular cells with a thin outer wall.

*Ground tissue.*—Multilayered, loosely set, rhomboidal cells enclosing many larger and smaller airspaces. Both types of calcium oxalate crystals, the druses and the raphides, are present in the airspaces providing mechanical protection.

*Vascular bundle.*—Each bundle is composed of small, closely set parenchymatous-like cells. Vessels are absent.

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*Leaf*

The following is the structure of leaf (Fig. 6*d*):

*Epidermis.*—Single-layered and without any cuticle.

*Ground tissue.*—The mesophyll is composed of loosely arranged globular cells with large and small airspaces. The airspaces are much smaller in size than those present in the ground tissues of tuber or runner. Both druses and raphides are present in the airspaces to give mechanical support to the leaf.

*Vascular bundle.*—Regularly arranged in the ground tissue. Each bundle is having closely set parenchyma cells but vessels are absent.

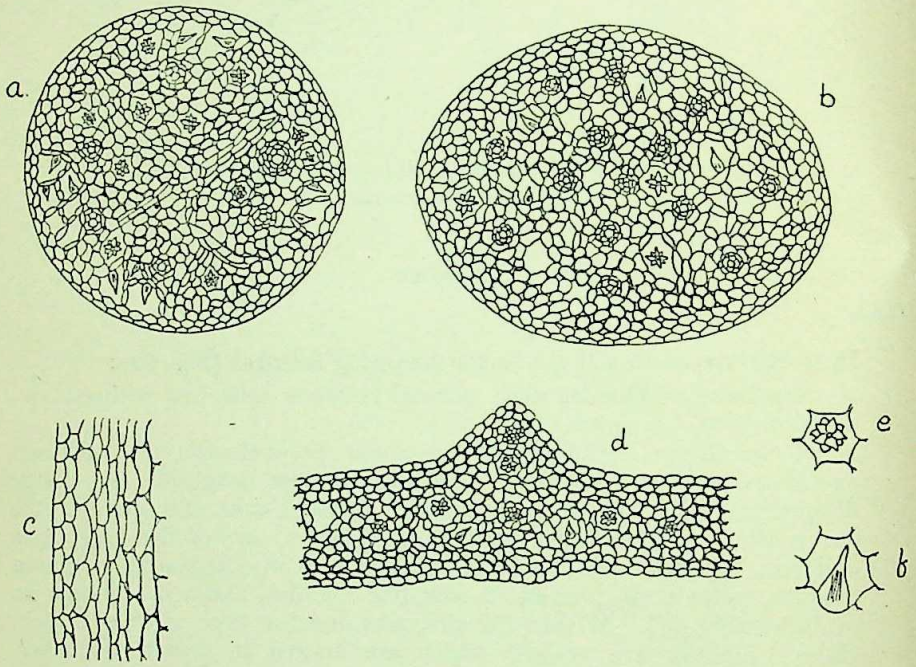


FIG. 6*a–f*. (*a*) transverse section of tuber; (*b*) transverse section of runner; (*c*) longitudinal section of runner; (*d*) transverse section of leaf; (*e*) calcium oxalate crystal druses; (*f*) calcium oxalate.

## REPRODUCTION

Aquatic plants reproduce very quickly and in various ways. Arber (1920) states that *Pistia* represents a type which is singularly successful in the matter of vegetative growth. Its reproduction is observed to be so rapid that within no time it chokes water channels and proves a serious hindrance to navigation. In *Pistia stratiotes* the different modes of reproduction are vegetative and sexual.

A. *Vegetative reproduction*

(i) Runners develop from all sides of the tuber of the parent plant. Each one of these runners develops at the apex a small bud which by gradual development forms a minute tuber with roots, rosettes of leaves and other vegetative parts, then this fully developed plant breaks off from the adjoining runner

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attached to the main plant and floats away as an independent plant (Fig. 7*a*).

(ii) In a tank when the growth of *Pistia* is very thick and no space is available between two plants for spreading, then a mature plant multiplies by developing vegetative buds on the tubers within the leaf rosettes of the mother plant. These buds develop further in that region to form new plants which come into prominence only when the mother plant dies (Fig. 7*b*).

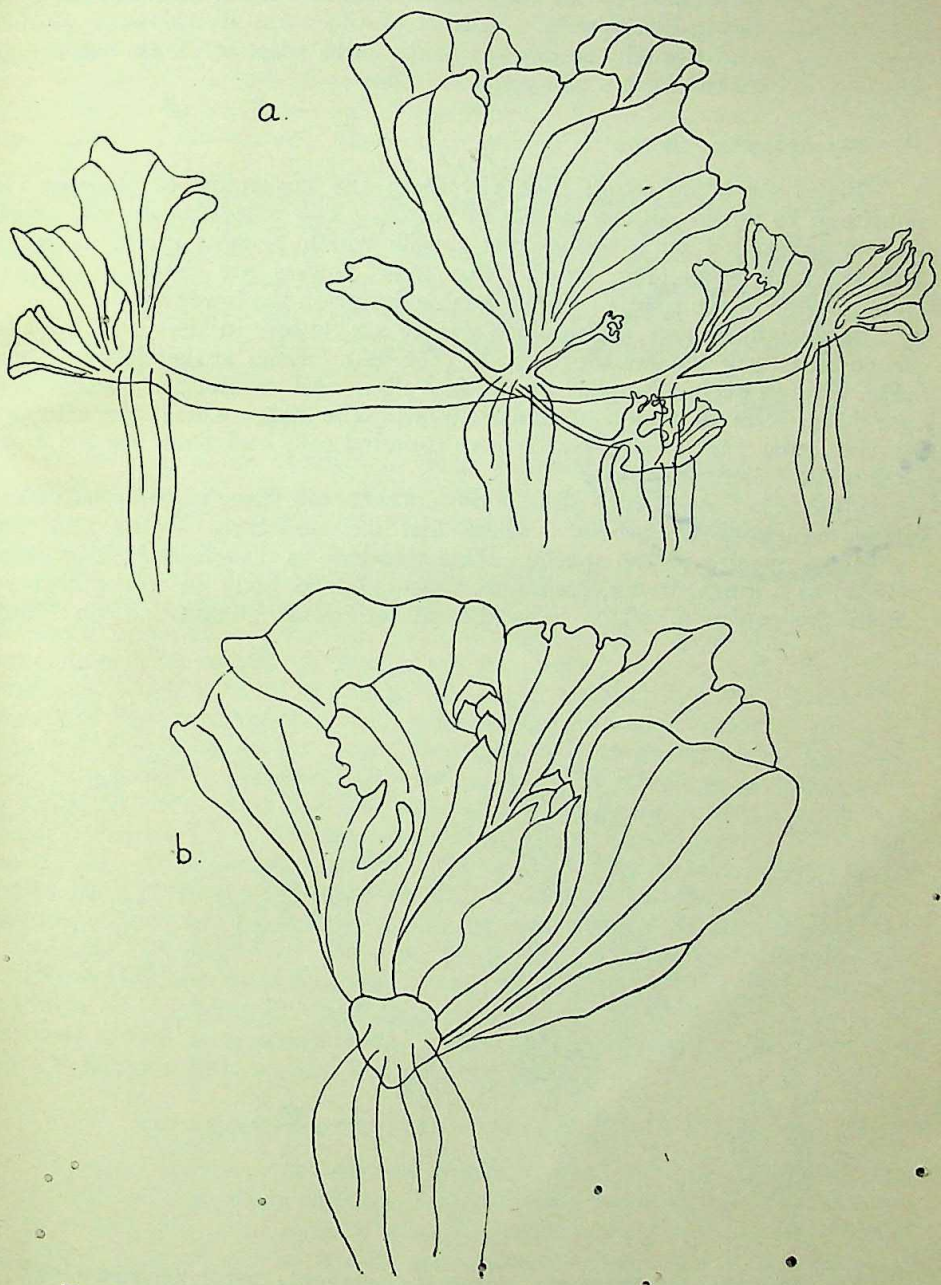


FIG. 7*a-b*. (*a*) runners developing from all sides of the tuber; (*b*) vegetative buds formed within the leaf rosettes on parent plant, nat. size.

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[2] *KSS.*, XXX, 97; VIII, 23-24; LXI, 282–84; LVI, 188; XXII, 128; LIV, 170-71; LXXX, 21; LXXIII, 246; LXXXIII, 24; VIII, 23-24.

[3] S. Beal, *Buddhist Records of the Western World*, Vol. II, p. 143.

[4] Kṣemendra, *Deśopadeśa*, Lesson VI, 28, Lesson III, 32; *Narmamālā*, Satire III, 68; *Samayamātṛkā*, II, 22; *R.T.*, VIII, 676, 1866-67, 285–89. Al Bīrūnī, *Sachau*, Vol. II, p. 151.

[5] A. L. Basham, *The Wonder that was India*, pp. 489-90.

[6] *KSS.*, CI, 118-19.

[7] *KSS.*, XLIV–L; III, 60–67; X, 146; VI, 13–15; LXXV, 131; LXXXVI, 113; VII, 82.

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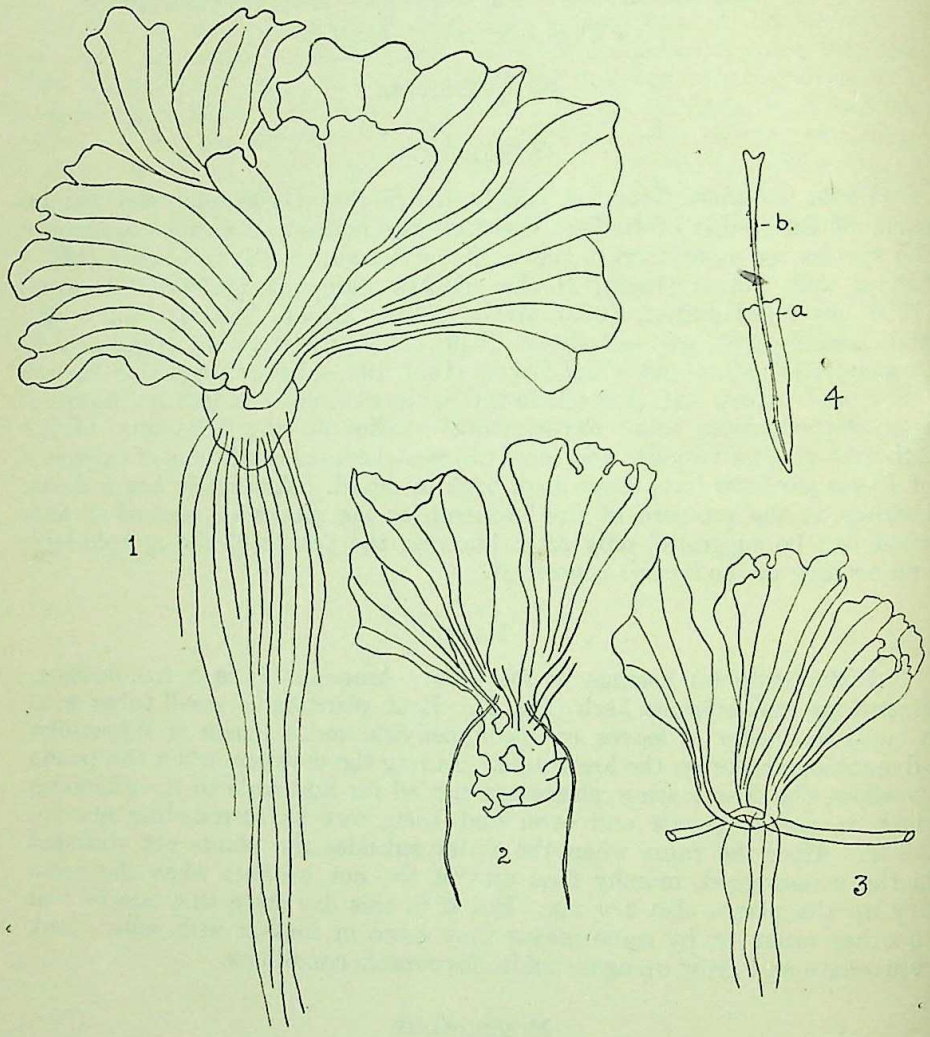
*Roots*

The roots develop in thick clusters from the base of the lowermost whorl of foliage leaves. The tips of the roots are protected by root pockets which are longer and more conspicuous than the rootcaps of the soil roots. Root hairs are few and not much prominent (Fig. 4).




FIGS. 1 to 4. 1, *Pistia stratiotes*, plant nat. size; 2, plant showing the marks of fallen leaf whorls on the basal side of the tuber, nat. size; 3, axillary development of runners, nat. size; 4, root, ×10; (4*a*), root pocket, (4*b*), root hairs.

*Leaves*

Leaves are arranged in close spiral around the apical part of the tuber. Each leaf is sessile, obovate-cuneate, entire with veins varying from 5 to 7 in number. Leaves are fleshy in texture with abundant hairs on the ventral surface. The vernation is involute (Fig. 5*a*). Gradually with the growth of the leaf, the lamina unrolls and extends to form the fully developed foliage (Fig. 5, *b–d*). Stomata are commonly present on the lower side

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of each leaf (Fig. 5*e*). The structure of stomata is very simple. The stomatal pore is enclosed by two kidney-shaped guard cells, one on each side. As in most hydrophytes, here also, the inner cutin ridges of the guard cells are lacking.

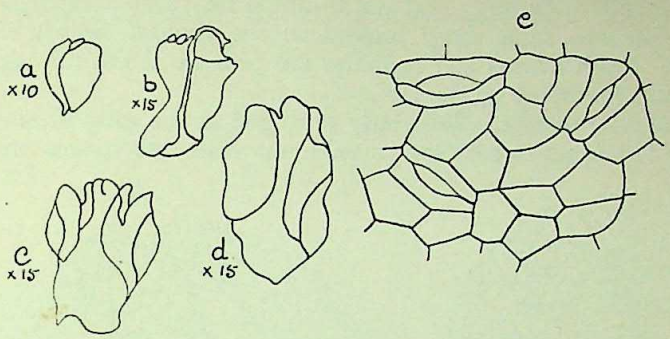


FIG. 5*a–e*. (*a*) leaf vernation; (*b–d*) opening of leaf from the bud stage; (*e*) stomata.

## ANATOMY

### *Tuber*

In transverse section it shows the following features (Fig. 6*a*):

*Epidermis*.—One-layered, parenchymatous cells but without any thickening on the outer wall.

*Ground tissue*.—Composed of irregular, parenchyma cells with air-chambers scattered all over. The airchambers have thin, one-celled diaphragms enclosing large airspaces. These diaphragms prevent the entire airchamber system from flooding when a part of the vegetative body is injured. Within these airchambers needle-shaped calcium oxalate crystals are present in cone-like bundles, these are known as raphides (Fig. 6*f*). Within the airspaces another type of star-shaped, globose crystals are present which are known as druses (Fig. 6*e*). Both the raphides and the druses provide mechanical support as well as protection against aquatic animals.

*Vascular bundles*.—Scattered all over the ground tissue. Each bundle is composed of one central vascular element surrounded by a few layers of small, closely set undifferentiated cells forming the conductive tissue.

### *Runner*

In transverre section (Fig. 6*b*) and in longitudinal section (Fig. 6*c*) it shows the following features:

*Epidermis*.—Single-layered, small, regular cells with a thin outer wall.

*Ground tissue*.—Multilayered, loosely set, rhomboidal cells enclosing many larger and smaller airspaces. Both types of calcium oxalate crystals, the druses and the raphides, are present in the airspaces providing mechanical protection.

*Vascular bundle*.—Each bundle is composed of small, closely set parenchymatous-like cells. Vessels are absent.

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(iii) *Regeneration of the vegetative parts.*—During the summer when the *Pistia* plants are exposed to the strong sun they lose the healthy green colour and become yellowish. Later gradually the leaves dry up and fall off, most of the roots decay, and only the tubers in a decaying state continue to float. When the monsoon comes and improves both the environmental and atmospherical conditions, these naked half-dead tubers become green and healthy in appearance and gradually start developing roots and leaves and later float as healthy, independent plants. Instead of the rains if unfavourable hot and drought conditions continue to exist for long, then these naked tubers will ultimately die.

B. *Sexual reproduction*

*Pistia* starts flowering generally from the beginning of August and continues to flower till the middle of March. The inflorescence is a simple spadix subtended by a herbaceous spathe which is light green in colour and is monocerous (Fig. 8*a–c*). The male flowers are arranged on the upper region of the spadix and the female flower on the lower region.

*Male inflorescence.*—There are five to six flowers in the male inflorescence encircling the knob of a stalk (Fig. 8*d*). Each anther is two-celled (Fig. 8*e*) and each cell opens by vertical slits. All around the spathe there are hairs each of which is multicellular. The hairs which are attached to the upper part of the spadix have rounded cells and those on the lower region have elongated cells.

Just below the cluster of male flowers there are three leaf-like structures which are very prominent. These leaf-like structures shrink and fall, after the opening of the spathe. This structure is described by Roxburgh (1832) as a green, fleshy, crenulate, saucer-shaped body or upper nectary, from the centre of which rises the antheriferous column. Prain (1903)

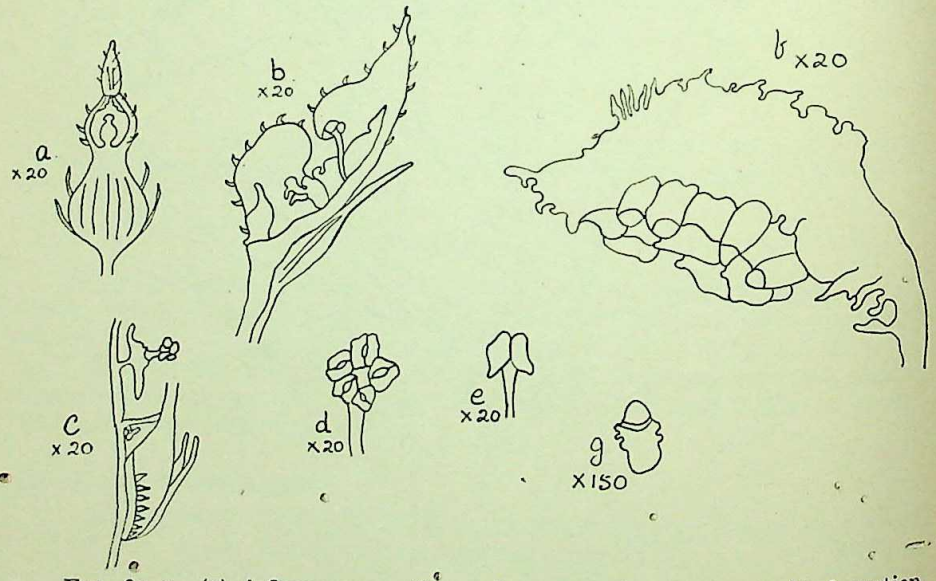


FIG. 8*a–g*. (*a*) inflorescence; (*b*) spathe removed; (*c*) longitudinal section of inflorescence; (*d*) male inflorescence; (*e*) bilocular anther; (*f*) ovules attached to the half-broken ovary; (*g*) seed.

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described these structures as neuters, minute and connate in a ring below the males. Haines (1922) also described this structure as a ring of minute confluent neuters below the male flowers.

*Female inflorescence.*—In each spadix below the neuters there is only one female flower. It is placed on a bent thalamus but the flower develops straight. The ovary is unilocular and the orthotropous ovules are arranged in sub-parietal placentation. After the female flowers are pollinated the male flowers are shed by the inflorescence, the spadix then has only the fertilized female flower which stands erect for three to five days more. Pollination is either caused by wind or by insects. After pollination when the ovules are 2 to 3 mm. in length, the lower side of the ovary wall breaks and exposes the ovules attached to the placenta. After a day or two the entire broken female flower gets detached from the inflorescence and floats on the surface of the water. The ovules remain attached to the floating half-broken ovary (Fig. 8*f*) for three to five days after which they get dispersed. The seeds when disseminated (Fig. 8*g*) gradually sink and ripen under water. The number of seeds in each fruit generally varies from 6 to 10 and very rarely the number is more than 10. It has been generally observed that when the seeds are disseminated they do not sink immediately to the bottom of the pond but generally they stick to the thick cluster of the roots of the same plant and much later, by some sort of disturbance, the seeds fall off from the root clusters.

## Seeds and their Germination

Under laboratory conditions from experimental studies it has been determined that 80 per cent of the disseminated seeds germinated almost immediately after a short dormant period. The rest of the 20 per cent showed some period of dormancy.

After dispersal, the seeds showed a very short dormant period and started germinating after about 14 to 35 days. The operculum which keeps the embryo covered within the seed protruded out first (Fig. 9*a*). Two to three days after a pair of foliage leaves started coming out (Fig. 9*b*). Gradually another pair of foliage leaves developed (Fig. 9*c*). With the growth of the second pair of foliage leaves the root also started developing (Fig. 9*d*), thus showing the lateral formation of roots as stated by Campbell (1900). The roots grew and also the second pair of foliage leaves opened up (Fig. 9*e*). The seed first lies horizontally on the bottom mud and, lying there, formation up to the second pair of foliage leaves occur. When the second pair of foliage open up fully the seed then leaves the bottom mud, comes up and floats vertically on the surface of the water. From the commencement of germination to floating up of the germinating seeds, the time taken is about 8 to 12 days. With the seed attached (Fig. 9*f*) the seedling floats for a week to about 10 days after which the seed gets detached and falls off. During the floating period with the seed attached, the plant develops a few more small roots. After the detachment of the seed the plant floats as a fully formed independent plant.

## Experimental Studies on the Role of Roots

It is generally known that absorption of nutrients in water-plants goes on throughout the whole surface of the different vegetative parts which are either submerged or in contact with the water surface. Controlled experiments were carried out to find the part played by the roots in absorption.

An earthenware tub of 40 cm. diameter and 32 cm. height was filled up with tap water and 10 cm. of soil at the bottom. Twenty-four mature,

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healthy *Pistia* plants were put in the tub and allowed to grow in it for a month. After a month the roots from the base of 12 plants only were broken off and every day these plants were checked and whenever roots were found to be present on these plants they were broken off constantly for six months. The other 12 plants with all the roots intact were grown in the same tub as control specimens.

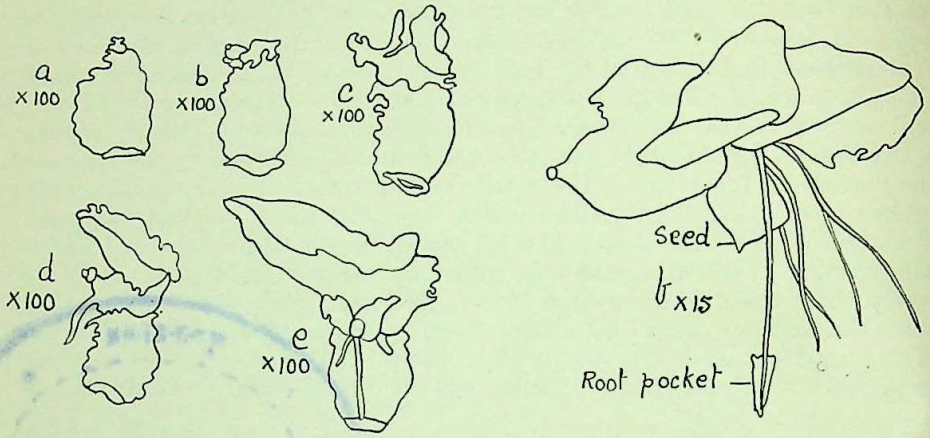


FIG. 9*a–f*. Seed germination. (*a*) Operculum protruding from the seed; (*b*) a pair of foliage leaves coming out; (*c*) second pair of foliage leaves developing; (*d*) root developing; (*e*) second pair of foliage opening up and the root showing growth; (*f*) seedling floating with the seed attached.

The behaviour of the plants with roots broken off and with roots intact is given in the table on page 123.

The experiment was repeated thrice with identical results. From this observation it can be stated that the roots play a very important role in absorption of nutrients. The experiments were carried out one from October to April and the two others from December to June. From the results of these experiments it can be stated that during any time of the year if the leaves and the roots of the *Pistia* plants are destroyed by any chance then the affected plants on getting favourable environment within five to six months will again develop like the normal healthy plants. But if continuously the roots and leaves are destroyed for more than eight months then that will help to destroy the floating, naked tubers completely.

## SOME PHYSICO-CHEMICAL CONDITIONS OF EXISTENCE

I. *Pistia stratiotes* was collected from six different types of natural ponds in Cuttack, Orissa, and the abundance of the plant in each pond was studied once a month with the physico-chemical conditions of the water and the bottom soil. The measurements of the ponds varied from :

Length : 17·385 to 89·06 metres
Breadth : 15·555 to 46·36 metres
And the average depth : 1·068 to 2·593 metres.

Table I gives the physico-chemical conditions of the water.
Table II gives the condition of the bottom soil of each tank.
Table III shows the abundance of the vegetation.

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| Plants | After 20–22 days | After 110 days | After 125 days | After 6 months | After 6½–7 months |
|---|---|---|---|---|---|
| *Pistia stratiotes*. From the base of 12 plants roots broken off. | Vigorous development of new roots continued. Later small, unhealthy root segments were developing. | The outer whorls of foliage leaves in a decaying state, the rest healthy. | Tuber and discoloured central leaves existing in a very unhealthy state. | Only the tuber present in a very unhealthy state. Six plants allowed to grow roots. Six remained rootless. | Six rootless plants further decayed. Six other plants grew healthy roots and later foliage started developing. |
| 12 plants kept intact with roots. | Plants healthy. | Plants healthy. | Plants healthy. | Plants healthy. | Plants healthy. |

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EVA MITRA

TABLE II

*Soil conditions of the natural ponds**

| 1958 | Tank No. 1 | | | Tank No. 2 | | | Tank No. 3 | | | Tank No. 4 | | | Tank No. 5 | | | Tank No. 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *p*H | Av. N | Av. $P_2O_5$ | *p*H | Av. N | Av. $P_2O_5$ | *p*H | Av. N | Av. $P_2O_5$ | *p*H | Av. N | Av. $P_2O_5$ | *p*H | Av. N | Av. $P_2O_5$ | *p*H | Av. N | Av. $P_2O_5$ |
| January .. | 6·8 | 29·1 | 24·6 | 6·8 | 29·7 | 26·0 | 7·2 | 26·9 | 20·0 | 7·3 | 44·8 | 30·0 | 7·1 | 29·7 | 32·4 | 7·3 | 31·4 | 40·2 |
| February .. | 6·8 | 29·4 | 26·0 | 6·7 | 32·0 | 26·0 | 7·1 | 30·1 | 21·6 | 7·1 | 44·0 | 32·0 | 7·0 | 30·6 | 32·2 | 7·2 | 32·6 | 42·0 |
| March .. | 6·6 | 30·2 | 26·2 | 6·7 | 38·1 | 28·0 | 7·1 | 34·6 | 24·2 | 7·1 | 46·2 | 40·0 | 7·0 | 37·5 | 34·6 | 7·1 | 31·8 | 48·4 |
| April .. | 6·5 | 40·0 | 32·0 | 6·6 | 38·1 | 36·0 | 6·9 | 38·0 | 32·4 | 7·0 | 46·8 | 40·0 | 7·0 | 37·5 | 42·2 | 6·9 | 36·6 | 60·4 |
| May .. | 6·5 | 45·0 | 36·4 | 6·4 | 52·1 | 38·0 | 6·8 | 40·3 | 34·2 | 6·8 | 54·8 | 60·0 | 6·8 | 50·5 | 50·6 | 6·7 | 38·8 | 60·8 |
| June .. | 6·5 | 36·8 | 30·2 | 6·4 | 39·8 | 36·0 | 6·6 | 49·4 | 28·0 | 6·8 | 48·8 | 50·0 | 6·8 | 48·8 | 50·0 | 6·8 | 37·0 | 55·6 |
| July .. | 6·7 | 30·0 | 24·8 | 6·7 | 38·0 | 30·0 | 6·8 | 38·4 | 24·6 | 7·2 | 40·2 | 45·2 | 6·9 | 36·0 | 42·2 | 7·0 | 30·1 | 48·2 |
| August .. | 6·8 | 28·0 | 24·4 | 6·9 | 37·5 | 28·0 | 6·9 | 26·2 | 24·2 | 7·1 | 40·0 | 43·8 | 6·9 | 29·1 | 40·6 | 7·0 | 30·2 | 44·4 |
| September .. | 6·8 | 30·0 | 24·2 | 7·0 | 25·7 | 28·0 | 6·9 | 24·8 | 24·0 | 7·2 | 40·4 | 42·0 | 7·1 | 31·3 | 40·0 | 7·1 | 31·0 | 44·6 |
| October .. | 6·9 | 32·4 | 22·8 | 6·8 | 26·2 | 24·0 | 6·8 | 26·4 | 24·0 | 7·1 | 38·0 | 37·6 | 7·3 | 30·2 | 38·2 | 7·2 | 31·0 | 42·0 |
| November .. | 6·9 | 31·9 | 20·4 | 6·8 | 26·6 | 24·0 | 6·9 | 24·2 | 24·0 | 7·2 | 36·4 | 36·4 | 7·2 | 29·8 | 36·8 | 7·4 | 30·6 | 38·2 |
| December .. | 6·9 | 30·0 | 20·6 | 6·9 | 28·5 | 22·0 | 6·9 | 21·8 | 21·8 | 7·2 | 35·3 | 34·0 | 7·2 | 29·0 | 36·0 | 7·3 | 29·7 | 36·8 |
| Range | 6·5–6·9 | 29·1–45·0 | 20·4–36·4 | 6·4–7·0 | 25·7–52·1 | 22·0–38·0 | 6·6–7·2 | 21·8–49·4 | 20·0–34·2 | 6·8–7·3 | 35·3–54·8 | 30·0–60·0 | 6·8–7·3 | 29·0–50·5 | 32·2–50·6 | 6·7–7·4 | 29·7–38·8 | 36·8–60·8 |
| Average .. | 6·7 | 33·6 | 26·1 | 6·6 | 34·4 | 29·0 | 6·9 | 31·8 | 25·3 | 7·1 | 43·0 | 41·0 | 7·0 | 35·8 | 39·7 | 7·1 | 32·6 | 46·9 |

* Results expressed as mg./100 gms.

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TABLE I

*Physico-chemical conditions of the natural ponds**

| 1958 | Tank No. 1 | | | | Tank No. 2 | | | | Tank No. 3 | | | | Tank No. 4 | | | | Tank No. 5 | | | | Tank No. 6 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *p*H | Total alkalinity $CaCO_3$ | $No_3N$ | $P_2O_5$ | *p*H | $CaCO_3$ | $No_3N$ | $P_2O_5$ | *p*H | $CaCO_3$ | $No_3N$ | $P_2O_5$ | *p*H | $CaCO_3$ | $No_3N$ | $P_2O_5$ | *p*H | $CaCO_3$ | $No_3N$ | $P_2O_5$ | *p*H | $CaCO_3$ | $No_3N$ | $P_2O_5$ |
| January .. | 8·2 | 140 | 0·04 | 0·30 | 8·2 | 38 | 0·03 | 0·20 | 8·2 | 80 | 0·04 | 0·16 | 8·2 | 268 | 0·05 | 0·60 | 8·6 | 174 | 0·05 | 0·20 | 8·0 | 272 | 0·04 | 1·6 |
| February .. | 8·2 | 140 | 0·05 | 0·52 | 8·2 | 54 | 0·04 | 0·20 | 8·0 | 88 | 0·05 | 0·32 | 8·2 | 308 | 0·08 | 0·82 | 8·8 | 202 | 0·08 | 0·80 | 8·2 | 360 | 0·08 | 1·6 |
| March .. | 8·2 | 160 | 0·08 | 0·68 | 8·2 | 68 | 0·06 | 0·38 | 8·0 | 88 | 0·06 | 0·42 | 8·3 | 324 | 0·08 | 0·84 | 8·4 | 224 | 0·08 | 1·6 | 8·4 | 456 | 0·08 | 2·0 |
| April .. | 8·2 | 210 | 0·08 | 1·2 | 8·1 | 90 | 0·12 | 0·40 | 8·2 | 90 | 0·08 | 0·52 | 8·0 | 334 | 0·16 | 1·8 | 8·6 | 340 | 0·16 | 2·4 | 8·6 | 580 | 0·12 | 3·5 |
| May .. | 8·2 | 252 | 0·12 | 1·4 | 8·0 | 137 | 0·18 | 1·2 | 8·2 | 92 | 0·16 | 0·92 | 8·0 | 348 | 0·28 | 4·0 | 8·8 | 372 | 0·20 | 1·6 | 8·8 | 592 | 0·20 | 4·0 |
| June .. | 8·0 | 140 | 0·12 | 0·76 | 8·1 | 48 | 0·08 | 0·80 | 8·0 | 72 | 0·10 | 0·72 | 7·9 | 144 | 0·20 | 3·2 | 8·6 | 264 | 0·16 | 1·6 | 8·6 | 432 | 0·12 | 3·5 |
| July .. | 8·2 | 132 | 0·07 | 0·78 | 8·2 | 40 | 0·04 | 0·78 | 8·0 | 30 | 0·06 | 0·52 | 8·3 | 160 | 0·18 | 3·0 | 8·4 | 260 | 0·12 | 0·72 | 8·4 | 338 | 0·15 | 3·0 |
| August .. | 8·4 | 136 | 0·07 | 0·70 | 8·0 | 40 | 0·05 | 0·76 | 8·4 | 44 | 0·05 | 0·40 | 8·3 | 168 | 0·16 | 2·8 | 8·1 | 224 | 0·10 | 0·80 | 8·5 | 294 | 0·10 | 3·2 |
| September .. | 8·4 | 140 | 0·05 | 0·70 | 8·2 | 42 | 0·05 | 0·68 | 8·4 | 48 | 0·04 | 0·35 | 8·2 | 188 | 0·16 | 1·8 | 8·2 | 180 | 0·08 | 0·68 | 8·5 | 256 | 0·08 | 2·4 |
| October .. | 8·3 | 140 | 0·05 | 0·60 | 8·3 | 40 | 0·05 | 0·46 | 8·4 | 48 | 0·04 | 0·30 | 8·1 | 192 | 0·10 | 1·6 | 8·4 | 148 | 0·06 | 0·70 | 8·5 | 256 | 0·15 | 2·0 |
| November .. | 8·3 | 144 | 0·06 | 0·32 | 8·3 | 42 | 0·05 | 0·38 | 8·4 | 54 | 0·05 | 0·25 | 8·2 | 238 | 0·12 | 1·2 | 8·2 | 152 | 0·06 | 0·32 | 8·4 | 264 | 0·08 | 2·4 |
| December .. | 8·4 | 146 | 0·04 | 0·35 | 8·3 | 38 | 0·04 | 0·30 | 8·4 | 62 | 0·04 | 0·20 | 8·3 | 276 | 0·10 | 0·84 | 8·2 | 156 | 0·07 | 0·30 | 8·5 | 276 | 0·20 | 2·8 |
| Range .. { | 8·0– | 132– | 0·04– | 0·30– | 8·0– | 38– | 0·03– | 0·20– | 8·0– | 30– | 0·04– | 0·16– | 7·9– | 144– | 0·05– | 0·60– | 8·1– | 148– | 0·05– | 0·20– | 8·0– | 256– | 0·04– | 1·6– |
| | 8·4 | 252 | 0·12 | 1·4 | 8·3 | 137 | 0·18 | 1·20 | 8·4 | 92 | 0·16 | 0·92 | 8·3 | 348 | 0·28 | 4·0 | 8·8 | 372 | 0·20 | 2·4 | 8·8 | 592 | 0·20 | 4·0 |
| Average .. | 8·3 | 157 | 0·07 | 0·69 | 8·2 | 56·4 | 0·07 | 0·55 | 8·2 | 66 | 0·06 | 0·42 | 8·2 | 246 | 0·14 | 1·88 | 8·6 | 225 | 0·10 | 0·98 | 8·5 | 365 | 0·12 | 2·7 |

* Results expressed as mg./litre.

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TABLE III

*Abundance of* Pistia stratiotes *Linn. in different months of the year in the natural ponds*

| 1958 | Tank No. 1 Length 169 ft. Breadth 152 ft. Av. depth 7½ ft. | Tank No. 2 Length 57 ft. Breadth 51 ft. Av. depth 5 ft. | Tank No. 3 Length 213 ft. Breadth 139 ft. Av. depth 8½ ft. | Tank No. 4 Length 292 ft. Breadth 145 ft. Av. depth 4 ft. | Tank No. 5 Length 113 ft. Breadth 60 ft. Av. depth 3 ft. | Tank No. 6 Length 124 ft. Breadth 97 ft. Av. depth 6 ft. |
|---|---|---|---|---|---|---|
| January .. | A | A | A | A | C | Sc |
| February .. | A | A | Cleaned by manual labour. Sc | A | Sc | Sc |
| March .. | A | C | Sc | A | Sc | Sc |
| April .. | A | C | Sc | A | Sc | Completely taken out |
| May .. | A | Sc | Sc | A | Sc | Sc |
| June .. | Sc | A | Sc | A | Sc | Cleaned |
| August .. | A | A | A | A | Sc | Nil |
| September .. | A | A | A | Sc | Sc | Nil |
| October .. | A | A | C | Sc | A | Sc |
| November .. | A | C | A | A | A | Sc |
| December .. | Sc | Sc | A | A | A | A |

A = Abundant; Sc = Scattered; C = Common.
Cleaning is done everywhere by manual labour.

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Table IV gives the measurements of the vegetative parts. From the monthly observations of these ponds it can be stated that *Pistia stratiotes* can tolerate water having:

*p*H : 7·9 to 8·8
Nitrate : 0·03 to 0·28 mg./litre
Phosphate : 0·16 to 4·0 mg./litres
Total alkalinity : 30·0 to 592·0 mg./litres
Soil having *p*H : 6·4 to 7·4.
Available nitrogen : 21·8 to 54·8 mg./100 gms.
Available phosphorus : 20·0 to 60·8 mg./100 gms.

From the study of the abundance of the vegetation (Table III) and from the measurements of the vegetative parts (Table IV), it can be stated that the abundance of the plant is not much affected throughout the year. Only morphological variations are observed during the different seasons of the year.

II. (*a*) The first set of experiment was set up to find out the tolerance of acidic or alkaline waters by *Pistia*. Six cylindrical glass jars, each jar 30 cm. in height and 20 cm. in diameter, were used. In each jar 5 cm. of soil, 20 cm. of tap water in height and 12 healthy *Pistia* plants were put in. The *p*H of the water in some jars were lowered up to the tenth day with the addition of concentrated sulphuric acid and in some jars it was increased with the addition of sodium hydroxide. The set-up of the experiment was as shown in the table on page 127.

The plants started showing degeneration in the acidic range from the third day and decayed completely within about 19 days. In these jars in which the plants decayed zooplankton and phytoplankton started developing from the nineteenth day and later they increased in abundance. The following phytoplankton were present:

| | | |
|---|---|---|
| *Oedogonium* sp. | .. | Common |
| *Microspora* sp. | .. | Abundant |
| *Chlamydomonas* sp. | .. | Common |
| *Navicula* sp. | .. | Common |
| *Pinnularia* sp. | .. | Common |
| *Cosmarium* sp. | .. | Common |
| *Caloneis* sp. | .. | Common |
| *Scenedesmus* sp. | .. | Common |
| *Fragillaria* sp. | .. | Common |
| *Pediastrum* sp. | .. | Few |
| *Amphora* sp. | .. | Few |
| *Eunotia* sp. | .. | Few |
| *Synedra* sp. | .. | Few |
| *Ankistrodesmus* sp. | .. | Few |
| *Tetraedron* sp. | .. | Common |

The following zooplankton were present:

| | | |
|---|---|---|
| Rotifer | .. | Abundant |
| *Paramoecium* sp. | .. | Abundant |
| *Difflusia* sp. | .. | Few |
| *Vorticella* sp. | .. | Abundant |

All the above-mentioned phytoplankton and zooplankton species serve as healthy food of major carps. Both the control and the alkaline jars in which the plant survived healthily, there was no growth of plankton flora or fauna. The experiment was repeated thrice with similar results.

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| Jar Nos. | *p*H of the jars adjusted up to the 10th day | Observation | | | |
|---|---|---|---|---|---|
| | | 3rd day | 7th day | 19th day | 50th day |
| 1<br>2 | Control<br>*p*H 7·5–8·0 | Healthy plants. | Healthy plants. | Healthy plants. | Healthy plants.<br>Plankton nil. |
| 3 | Acidic range | The foliage leaves opened up and yellowish in colour. | Almost completely decayed. | Plants completely decayed. Colour of the water slightly green. | Plants completely decayed. Abundant phytoplankton and zooplankton. |
| 4 | *p*H 3·5–4·0 | Roots are white and very unhealthy. | | Phytoplankton and zooplankton many. | ,, |
| 5<br>6 | Alkaline range<br>*p*H 11·0–12·0 | Healthy plants. | Healthy plants. | Healthy plants. | Healthy plants.<br>Plankton nil. |

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TABLE IV

*Measurements of vegetative parts of healthy* Pistia stratiotes *Linn.*

| 1958 | Root length (mm.) | Leaf | | | Vegetative reproduction | |
|---|---|---|---|---|---|---|
| | | length (mm.) | width (mm.) | Number of veins | Number of plants in clusters | Number of buds in each plant |
| Tank No. 1 | | | | | | |
| June .. .. | 5·7–11·5 | 6·5–8·8 | 3·8–5·0 | 7 | 2–11 | 1–3 |
| November .. | 175–247 | 48–50 | 30–60 | 5–7 | 3–8 | 1–5 |
| Tank No. 2 | | | | | | |
| June .. .. | 3·1–19·6 | 2·7–3·9 | 2·0–3·0 | 5 | 3–9 | 1–4 |
| November .. | 90–355 | 42–80 | 36–55 | 7 | 3–8 | 2–4 |
| Tank No. 3 | | | | | | |
| June .. .. | 18·7–42·0 | 3·1–5·4 | 2·5–4·7 | 5–7 | 3–7 | 1–3 |
| November .. | 106–240 | 39–77 | 31–54 | 6–7 | 5–9 | 2–4 |
| Tank No. 4 | | | | | | |
| June .. .. | 11·3–26·8 | 3·2–4·5 | 2·3–3·8 | 5–7 | 4–10 | 1–4 |
| November .. | 112–245 | 45–100 | 32–50 | 0–7 | 3–6 | 1–2 |
| Tank No. 5 | | | | | | |
| June .. .. | 5·4–12·8 | 2·7–4·1 | 2·1–3·3 | 5–7 | 4–17 | 1–3 |
| November .. | 100–290 | 30–41 | 21–42 | 5–7 | 4–12 | 2–4 |
| Tank No. 6 | | | | | | |
| June .. .. | 2·1–15·5 | 3·0–4·5 | 2·8–3·9 | 5–7 | 2–4 | 1–2 |
| November .. | 40–127 | 37–72 | 25–45 | 6–7 | 2–9 | 1–3 |

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(*b*) *Second set of experiment:*

In the previous set of experiments (*a*) *Pistia* plants showed decomposition in acidic waters only, so in this set of experiment the *p*H of the water in jars was kept in acidic range only, between 3·5 and 5·0. Eight cylindrical glass jars were taken and the set-up of the experiment was as follows:

| Jar Nos. | *p*H of the jars | Observation | | |
|---|---|---|---|---|
| | | 2nd day | 6th day | 13th day |
| 1, 2 | Control *p*H 7·5–8·0 | Healthy plants. | Healthy plants. | Healthy plants. |
| 3 | *p*H 5·0 | The plants just opening up and the roots just started curving. | Only the outermost whorl of foliage has yellow tips and a slight unhealthy appearance. | The decaying plants decayed further but still most of them are in a floating and healthy state. |
| 4 | | | Most of the plants dead and decaying. | Decaying plants decayed further. |
| 5 | *p*H 4·0 | Plants opened up and the leaves have lost the healthy green colour. | Decayed further. | Decayed further. |
| 6 | | The roots are unhealthy white and curving up. | Decayed further. | Decayed further. |
| 7 | *p*H 3·5 | All plants completely opened up, 90 per cent leaves have brown colour, rest brownish green. | Decayed further. | Decayed almost completely. |
| 8 | | Roots unhealthy white and curved up. | | Plankton just started developing. |

The *p*H in the different jars was adjusted by adding moderately concentrate sulphuric acid as required. On the second day from the application of acid the plants in jar Nos. 3 and 4 showed affected similarly but later the plants in jar No. 3 were healthy and those in jar No. 4 showed decay to some extent. In jar Nos. 5, 6, 7 and 8 there was complete decay of the plants but in 13 days the decay was most in jar No. 8. The experiment was repeated thrice with similar results.

(*c*) *Third set of experiment:*

In this experiment in each jar a measured quantity of concentrated sulphuric acid was put in, after which a record of the *p*H was kept. The set-up of the experiment was as shown in the table on page 130.

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| Jar Nos. | Addition of concentrated sulphuric acid | *p*H of the jars | Observation | | | |
|---|---|---|---|---|---|---|
| | | | 2nd day | 6th day | 11th day | 18th day |
| 1, 2 | Control nil. | 7·0 | Healthy plants. | Healthy plants. | Healthy plants. | Healthy plants. |
| 3 | 0·1 cc. per litre of water. | 6·5 | No change in the plants. | Plants decayed to some extent. | The roots black, outermost whorl of foliage decayed. Other leaves green with edges yellow. | 50% dead and 50% in an unhealthy state. |
| 4 | 0·1 cc. per litre of water. | 6·4 | No change in the plants. | Plants decaying but in some plants still innermost leaves are green and healthy. | Roots of all plants decayed and also the leaves of most plants decayed. A few plants having the innermost whorl green. | 80% dead and 20% in an unhealthy state. |
| 5 | 0·05 cc. per litre of water. | 6·6 | No change in the plants. | Not much affected. | Plants not very healthy with yellow green coloured leaves. | 20% dead and 80% in an unhealthy state. |
| 6 | 0·05 cc. per litre of water. | 6·4 | No change in the plants. | Not much affected. | Not much affected. | Not much affected. |
| 7 | 0·025 cc. per litre of water. | 6·4 | No change in the plants. | Healthy plants. | Healthy plants. | Healthy plants. |
| 8 | In each jar. | 6·0 | | | | |

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It is observed from the above table that concentrated sulphuric acid when added from 0·1 cc. to 0·025 cc. per litre of water in each jar, the variation in the change of *p*H of the water is almost negligible. But the jars in which 0·1 cc. per litre of water and acid is added the decay of plants is much more in 18 days than in jars where lower dosage of acid is added.

By comparing the results of all the above experiments it is observed that *p*H was not the only factor causing the death of the plants. The addition of 0·1 cc. of concentrated sulphuric acid per litre of water showed the death and decomposition of plants more in one jar than the other but in both the jars the plants were affected to a great extent. The plants in the jars treated with 0·05 cc. of acid per litre of water were affected slightly. From this it can be stated that with the addition of acid in water there might be some other change in the physico-chemical condition of the water.

(*d*) *Fourth set of experiment:*

Basing on the previous experiment another experiment was set up in which measured quantity of concentrated sulphuric acid was added as before and a record of the phosphate content of the water was kept in addition.

Three cylindrical glass jars as before were taken. In each jar measured quantity of tap water and four healthy *Pistia* plants were put in. In each of the two jars, measured quantity of concentrated sulphuric acid was added and the third jar was kept as control. The following are the changes of *p*H and phosphate content of the water:

| Date | Control Jar | | Jar No. 1 | | Jar No. 2 | |
|---|---|---|---|---|---|---|
| | *p*H | Phosphate p.p.m. | *p*H | Phosphate p.p.m. | *p*H | Phosphate p.p.m. |
| 28–8–58 | 7·1 | Trace | 7·5 | Trace | 7·5 | 0·04 |
| 30–8–58 | No Treatment | | Concentrated sulphuric acid added in each jar at the rate of 1·0 cc. per litre of water at 3·30 p.m. | | | |
| — | | | 4·8 | 7·4 | 4·6 | 8·7 |
| 1–9–58 | 7·1 | Trace | 6·0 | 5·2 | 6·0 | 6·8 |
| 3–9–58 | | | 6·2 | 6·2 | 6·2 | 6·2 |
| 5–9–58 | | | 6·4 | 6·4 | 6·4 | 6·2 |
| 10–9–58 | 7·0 | Trace | 6·7 | 6·6 | 6·7 | 6·4 |
| 17–9–58 | 7·0 | 0·04 | 7·2 | 4·5 | 7·1 | 5·0 |
| 25–9–58 | 7·0 | Trace | 7·3 | 4·0 | 8·3 | 4·5 |

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*Pistia stratiotes* showed healthy growth in the control jar only where the phosphate content was merely traces. In the experimental jars, where the phosphate content was 4·0 to 8·7 p.p.m. after the addition of concentrated sulphuric acid, *Pistia* not only could not survive healthily but showed signs of decay. In both jars the phosphate content was more after the addition of concentrated sulphuric acid at the rate of 1·0 cc. per litre of water for about 12 days only. The destruction of the plants started during that time and also continued later.

III. In natural tanks it is observed that the *Pistia* plants survived healthily when the phosphate content of the water varied from 0·16 to 4·0 mg./litre and nitrate content varied from 0·03 to 0·28 mg./litre. A laboratory experiment was set up with a standard solution, in which the phosphate and nitrate contents of the water were different than the amount present in natural waters, to find out whether *Pistia* could tolerate healthily such conditions or not for existence. The standard solution used was Knop's solution which was as follows:

| | | |
|---|---|---|
| Calcium nitrate | .. | 0·8 gm. |
| Potassium nitrate | .. | 0·2 gm. |
| Potassium dihydrogen phosphate | .. | 0·2 gm. |
| Magnesium phosphate | .. | 0·2 gm. |
| Ferric phosphate | .. | Trace |
| Water | .. | 1,000 cc. |

Tap water was used for making the solution. Chemical content of tap water was as follows:

| | | |
|---|---|---|
| *p*H | .. | 7·8 |
| Total alkalinity | .. | 74 p.p.m. |
| Phosphate | .. | 0·08 p.p.m. |
| Nitrate | .. | 0·6 p.p.m. |

From Table V it is observed that the Knop's solution in tap water in which the *Pistia* plants were grown, the phosphate content of the water varied from 1·5 to 19·98 p.p.m. and the nitrate content varied from 75 to 115 p.p.m., whereas in the control jars the phosphate content varied from trace to 2·96 p.p.m. The plants were healthy in control jars with soil and also healthily surviving in control jars without soil, but in the three experimental jars the plants were completely dead and decayed within 29 days. In natural tank waters the phosphate content varied from 0·16 to 4·0 mg./litre and nitrate content varied from 0·03 to 0·28 mg./litre. Already from experiment II (*d*) it is observed that *Pistia* can partially tolerate to some extent in an unhealthy manner phosphate content from 4·0 to 8·7 p.p.m. In the control tubs the *Pistia* plants survived very healthily, the phosphate content varied from 0·1 to 0·76 p.p.m. The nitrate content of water in these tubs is also much less than the jars in which the plants are growing in culture solution, so from the above observations it can be stated that the excess amount of the nitrate content in the experimental jars, that is 75 to 115 p.p.m., is responsible in combination with the phosphate content of water which is also more than in natural waters for the destruction and decomposition of the *Pistia* plants within 25 to 30 days.

IV. *Type of substratum tolerated by* Pistia stratiotes

A laboratory experiment was set up with different types of soil to find out the type of substratum required for healthy growth of *Pistia stratiotes* plants.

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TABLE V

*Growth of* Pistia stratiotes *in medium with increased phosphate and nitrate contents*

| | Glass Jars | | 1st day | 6th day | 13th day | 20th day | 29th day |
|---|---|---|---|---|---|---|---|
| Knop's solution with soil<br>Calcium nitrate .. 0·8 gm.<br>Potassium nitrate .. 0·2 gm.<br>Potassium dihydrogen phosphate .. 0·2 gm.<br>Magnesium phosphate 0·2 gm.<br>Ferric phosphate .. trace<br>Water .. 1,000 cc. | 1 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 6·8<br>60·0<br>2·75<br>75 | 6·9<br>60·0<br>8·0<br>85 | 7·0<br>55·0<br>19·98<br>110 | 6·8<br>40·0<br>9·96<br>115 | All the *Pistia* plants in all the three jars are completely dead and the decaying parts at the bottom of the jars lying as substratum. |
| | 2 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 6·8<br>66·0<br>1·5<br>100 | 6·9<br>66·0<br>4·0<br>100 | 7·4<br>45·0<br>16·23<br>110 | 6·4<br>40·0<br>14·96<br>100 | |
| | 3 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 6·9<br>60·0<br>1·5<br>75 | 7·1<br>60·0<br>6·0<br>75 | 7·3<br>30·0<br>16·23<br>85 | 6·8<br>30·0<br>19·96<br>80 | |
| Tap water without soil<br>Tap water: *p*H .. 7·8<br>Total alkalinity ($CaCO_3$) .. 74·0 p.p.m.<br>Phosphate ($P_2O_5$) 0·08 p.p.m.<br>Nitrate ($NO_3$) .. 0·6 p.p.m. | 4 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 7·3<br>72·0<br>1·4<br>1·0 | 7·2<br>84·0<br>0·1<br>2·25 | 7·6<br>90·0<br>1·48<br>1·6 | 7·5<br>90·0<br>1·71<br>2·0 | The plants are not very healthy. Leaves smaller in size are present and roots though getting detached yet new ones are also developing. |
| | 5 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 7·3<br>72·0<br>0·6<br>0·75 | 7·5<br>84·0<br>trace<br>0·25 | 8·0<br>85·0<br>1·08<br>1·1 | 7·6<br>90·0<br>1·96<br>0·35 | |
| | 6 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 7·5<br>66·0<br>0·3<br>trace | 7·5<br>72·0<br>1·5<br>0·5 | 8·1<br>75·0<br>2·75<br>0·75 | 7·4<br>60·0<br>2·96<br>1·25 | |
| Tap water with soil | 7 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 7·0<br>96·0<br>1·4<br>0·3 | 7·6<br>96·0<br>0·1<br>0·6 | 8·1<br>90·0<br>1·98<br>0·25 | 7·2<br>70·0<br>1·06<br>0·55 | Plants very healthy. |
| | 8 | *p*H<br>$CaCO_3$<br>$P_2O_5$<br>$NO_3$ | 6·9<br>72<br>1·5<br>0·6 | 7·1<br>120<br>1·1<br>0·1 | 7·2<br>185<br>2·95<br>0·6 | 7·6<br>220<br>0·35<br>0·76 | |

Results expressed in p.p.m.

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TABLE VI

*Substratum experiment*

| Date | Tub numbers | Substratum | *p*H | Dissolved oxygen | Phosphate p.p.m. | Nitrate p.p.m. | Total alkalinity p.p.m. | Plant weight |
|---|---|---|---|---|---|---|---|---|
| 12–1–59 | 1 | Nil | 7·2 | 4·4 | 0·4 | 0·04 | 128 | 200 gms. of healthy *Pistia* plants in each. |
| | 2 | Soil .. 75% Sand .. 25% | 7·6 | 12·4 | 0·25 | 0·1 | 90 | |
| | 3 | Soil .. 25% Sand .. 75% | 7·2 | 8·4 | 0·45 | traces | 68 | |
| | 4 | Sand .. 100% | 7·6 | 8·6 | 0·2 | 0·06 | 66 | |
| | 5 | Soil .. 100% | 7·2 | 7·2 | 1·6 | 0·06 | 80 | |
| 19–1–59 | 1 | | 7·2 | 1·6 | 0·8 | 0·15 | 152 | Plants healthy. |
| | 2 | | 7·2 | 7·6 | traces | 0·06 | 20 | ,, ,, |
| | 3 | | 7·0 | 6·8 | 0·04 | 0·06 | 54 | ,, ,, |
| | 4 | | 6·8 | 8·0 | traces | 0·1 | 44 | ,, ,, |
| | 5 | | 6·9 | 9·2 | 0·12 | 0·1 | 56 | ,, ,, |
| 26–1–59 | 1 | | 7·2 | 2·0 | 2·0 | 2·5 | 232 | Roots are getting detached. |
| | 2 | | 7·4 | 9·0 | 0·08 | 0·5 | 60 | Plants healthy. |
| | 3 | | 6·8 | 8·4 | 0·08 | 0·6 | 50 | ,, ,, |
| | 4 | | 6·8 | 8·8 | traces | 0·4 | 38 | ,, ,, |
| | 5 | | 6·8 | 8·0 | 0·2 | 0·5 | 44 | ,, ,, |
| 3–2–59 | 1 | | 7·0 | traces | 3·0 | 2·0 | 214 | Roots gone more, leaves also decaying. |
| | 2 | | 7·9 | 8·8 | 0·3 | 0·5 | 60 | Plants healthy. |
| | 3 | | 6·4 | 6·0 | 0·32 | 0·68 | 40 | ,, ,, |
| | 4 | | 6·4 | 6·4 | 0·28 | 0·5 | 32 | ,, ,, |
| | 5 | | 6·4 | 7·2 | 0·56 | 0·56 | 26 | ,, ,, |
| 21–4–59 | 1 | Nil | 7·3 | traces | 4·0 | 0·2 | 166 | Plants dead and completely decomposed. |
| | 2 | Soil .. 75% Sand .. 25% | 7·4 | 5·6 | 0·16 | 0·25 | 124 | Plants healthy—280 gms. |
| | 3 | Soil .. 25% Sand .. 75% | 6·9 | 4·4 | 0·2 | 0·375 | 36 | ,, ,, —570 gms. |
| | 4 | Sand .. 100% | 6·8 | traces | 0·06 | 0·5 | 88 | ,, ,, —1,025 gms. |
| | 5 | Soil .. 100% | 7·0 | 5·2 | 2·0 | 0·8 | 86 | ,, ,, —290 gms. |

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Five earthenware tubs were taken with substratum varying in the following manner:

| | | |
|---|---|---|
| Tub 1 | .. | substratum nil |
| Tub 2 | .. | pond mud 75 per cent + sand 25 per cent |
| Tub 3 | .. | pond mud 25 per cent + sand 75 per cent |
| Tub 4 | .. | sand 100 per cent |
| Tub 5 | .. | pond mud 100 per cent |

Each tub was filled with tap water. Tap water was allowed to settle down and become clear when 200 gms. of healthy *Pistia* plants were liberated in each tub. The observation was continued for three months and nine days. Table VI gives the detail of the water analysis.

After three months it was observed that the tub in which there was no substratum the plants were completely dead and decayed. In tub No. 4, in which the substratum was 100 per cent sand, the plants had shown a maximum increase in weight, that is 1,025 gms. The next increase in weight, that is 570 gms., was in tub No. 3 in which the substratum was a mixture of sand 75 per cent and pond mud 25 per cent. Tub No. 5 in which soil was 100 per cent and also in tub No. 2 in which soil was 75 per cent and sand 25 per cent increase in weight was not so much as in tub Nos. 3 and 4. By comparing the weight of plants and the health of plants in each tub it can be stated that the growth was best in the tub in which the substratum was sand 100 per cent and second best in which sand was 75 per cent. From the chemical analysis of water it is found that the variation is not much in comparison to the natural waters, that is ponds in which the *Pistia* plants were growing very healthily. The tub in which the substratum was absent the plants could not survive at all but the chemical aspect of the water in that tub was almost similar to other tubs.

## Discussion

From various literature it is observed that the morphological aspects of *Pistia stratiotes* Linn. have been worked out to some extent but not in much detail. Arber (1920) states that *Pistia* represents a type which is singularly successful in the matter of vegetative growth which has also been observed by the author.

While studying the foliage leaves it is observed that stomata are very commonly present on the lower surface of each leaf. Griffith (1851) mentions the absence of stomata on the leaves of *Pistia*. Arber (1920) mentions about the water pore only. Esau (1954) states that stomata occur on some submerged aquatic plants and not in others. Coulter and Cowles (1931) state that in floating foliage organs the submerged undersurface is without stomata while they are abundant on the emersed upper surface.

From the study of the internal structure it is observed that vessels are present only in the floating tuber and not in the other parts of the plant body. The vascular bundles in floating tuber have a few annular vessels and in the other parts of the plant body they are composed of closely set, small, undifferentiated cells. In *Pistia* the roots, tubers, runners and ventral surfaces of some of the foliage leaves are always in contact with water through which absorption goes on freely and so there is no need of conductive tissue.

All the vegetative parts show the presence of large and small airchambers in good numbers. To give mechanical support as well

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as protection from animals to the delicate tissues the calcium oxalate crystals, like the raphides and the druses, are found within the airspaces.

It is already a known fact that none of the ponds should be having over-abundance of aquatic vegetation from the health point of view. But especially the piscicultural tanks should remain clear of unwanted vegetation for a good crop of fish. *Pistia* is a very common weed and, if a water area is once infected with this plant, it shows rapid vegetative multiplication, choking up the water enclosure within a short period. With a view to find out means for keeping a check on the growth and multiplication of the plants, natural conditions under which the plant grows and multiplies healthily have been studied. It was observed that the plant tolerated healthily the water conditions having *p*H varying from 7·9 to 8·8, nitrate from 0·03 to 0·28 mg./litre, phosphate from 0·16 to 4·0 mg./litres, total alkalinity from 30 to 592 mg./litres and the soil having *p*H 6·4 to 7·4, available nitrogen 21·8 to 54·8 mg./100 gms., available phosphorus 20·0 to 60·8 mg./100 gms. Some laboratory experiments were carried out varying some specific conditions of the water and it was observed that *Pistia* plants could tolerate healthily alkaline water up to *p*H 12·0. When the *p*H of water was made acidic by the addition of a definite quantity of concentrated sulphuric acid, it was observed that it was not directly responsible for the death and decay of *Pistia* plants but it changed the balance of nitrate and phosphate content of the medium and ultimately led to the destruction of the floating vegetation *Pistia stratiotes*.

While discussing the relationships of organisms and environment in aquatic communities Reid (1961) writes that the free floating hydrophytes and rooted plants with floating leaves influence energy relationships and community composition in various ways. Both groups may contribute to a surface massing of such extent as to shield the underlying water from sunlight, thereby inhibiting organic production. In warm regions the water underneath such mats has frequently been found to be nearly oxygenless. The roots of free floating plants extract dissolved nutrients from the water and, together with the under surfaces of floating leaves, often harbour rich communities of organisms and serve as the substrate for egg deposition of a number of animals. So from the above facts it can be stated that a fish pond should always be kept free of over-abundant aquatic vegetation whether free floating or rooted.

While studying the germination of seeds it is observed that the growth of foliage leaves is terminal and roots show lateral formation.

From the laboratory experiments it is also observed that the presence of substratum is essential for the survival of *Pistia* plants and also it prefers a sandy substratum for its healthy growth and multiplication.

## Summary

Some aspects of the habit, external and internal morphology of *Pistia stratiotes* Linn. have been studied in detail. It has been observed that it is a very delicate, free floating plant with a good amount of airspaces and can also survive for a considerable period even if a part of the vegetative body is missing. An account of reproduction, both vegetative as well as sexual, with the germination of seed in the plant is given. It shows great success in vegetative multiplication.

Some aspects of the physico-chemical conditions of existence in nature have been studied. Basing on these data collected from natural environment, under laboratory conditions changing one of the aspects of the natural environment, the conditions of plant growth have been studied. It is

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observed that the concentrated sulphuric acid that was used for making the medium acidic was not directly responsible for the death and decay of the *Pistia* plants but it changed the balance of nitrate and phosphate content of the medium and ultimately led to the destruction of the vegetation.

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# THE AUTHORSHIP OF *SŪRJANACARITAM*

By R. C. Majumdar

(*Received June 13, 1967*)

There is a manuscript of an epic poem called *Sūrjanacaritam* in the collection of the Asiatic Society, Calcutta. It was first brought to the notice of the public by Dr. Rajendra Lal Mitra[1] and a short account of it has been given by MM. Haraprasād Śāstrī.[2] A more detailed account of its contents was given by Dr. H. C. Ray.[3] This *Mahākāvya*, as it is called, is divided into 20 cantos and contains 2,200 *ślokas*. The first 12 cantos give an account of the famous Cāhamāna kings of Śākambharī, including such great historical figures as Ajayapāla, Pṛthvīrāja and Hammīradeva. The next canto mentions the names of 16 kings of a branch family, ending with Sūrajana. The rest of this canto (XIII) as well as the next six cantos describe the career of Sūrajana or Sūrjana, the hero of the poem whose name it bears up to his death. The last canto (XX) is devoted to his son, Bhoja.

An historical poem of this kind is very rare in Sanskrit literature and certainly deserves a more careful study than it has yet received. But it has got a further interest from the fact that MM. Haraprasād Śāstrī has unhesitatingly described its author as a Bengali of the Vaidya caste, and this view has been adopted, without any question, by Dr. Hem Chandra Ray. It is the object of this paper to discuss how far this view is tenable.

In the last verse of the poem the author describes himself as Candraśekhara of the Gauḍīya Ambaṣṭha family, and tells us that he composed this poem at the request of Sūrjana and in the city of Banaras. On this basis alone Śāstrī commences his account of the manuscript with the words: 'By Candraśekhara of Bengal, an Ambaṣṭha or Vaidya by caste.' Dr. H. C. Ray not only accepted this view, without any question, but sought to identify the author with Vaidya Candraśekhara, mentioned in the *Caitanya-caritāmṛta* of Kṛṣṇadāsa Kavirāja.[4]

Unfortunately, none of these two eminent scholars has discussed the question in detail, and tried to meet the serious objections that may be urged against this view. In the first place, the well-known fact that Gauḍa in the Medieval Age designated nearly the whole of Northern India (cf. *Pañca* Gauḍa) and Gauḍa Brāhmaṇas, Gauḍa Kāyasthas and Gauḍa Rājputs, unknown in Bengal, lived in various parts of Upper India should make us hesitate to accept Gauḍīya Ambaṣṭha as belonging to Bengal, particularly as there is no Ambaṣṭha caste in Bengal today. It is likely that there were Ambaṣṭha castes in Bengal in the sixteenth century, for the *Brahma-vaivarta Purāṇa* and the *Bṛhaddharma Purāṇa*, which probably reflect the social conditions of Bengal in the fourteenth-fifteenth century or a little later, include Ambaṣṭha in the list of castes. But while the

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[1] *Notices of Sanskrit Manuscripts*, Vol. I, 1871, No. LXXVI, pp. 42-43.

[2] *A Descriptive Catalogue of Sanskrit Manuscripts* in the Government Collection under the care of the Asiatic Society of Bengal, by Haraprasad Śāstrī, Vol. IV, 'History and Geography', p. 8, No. 3084.

[3] *I.H.Q.*, XIV, pp. 570 ff.

[4] Dr. Ray has quoted a passage from this book (*Ādilīlā*, Ch. X, vv. 150–52). There are other passages also in this book which refer to Candraśekhara (*Madhyalīlā*, Ch. 17, vv. 87–92; Ch. 19, v. 202; and Ch. 25).



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latter regards the Vaidyas as identical with the Ambaṣṭhas, the former mentions them as two separate castes.[1] There are two well-known genealogical histories of the Vaidyas in Bengal. One of these, the *Candraprabhā*, composed in A.D. 1675, regards the Vaidyas as Ambaṣṭhas, but the other, the *Sadvaidya-kula-pañjikā*, composed in A.D. 1653, does not mention any such thing. Besides, the Kāyasthas of Bihar and the barbers of distant Tamil countries regard themselves as Ambaṣṭhas, and there are Ambaṣṭha castes in other places, too. In view of all these, anyone calling himself Ambaṣṭha cannot be regarded as Vaidya without any further evidence. Thus the author of the *Sūrjanacaritam*, who calls himself a Gauḍīya and an Ambaṣṭha, need not be taken necessarily to be a Bengali or a Vaidya.

We may now take up the question of the identification of the author, Candraśekhara, with the devotee of Caitanya, Vaidya Candraśekhara, mentioned in the *Caitanya-caritāmṛta*. It is somewhat curious that Dr. H. C. Ray, who started this hypothesis, did not consider the question from the chronological point of view. The *Sūrjanacaritam* mentions the conquest of Ranthambhor by the Mughal Emperor Akbar from Sūrjan who received some territories in exchange and settled in Banaras. It adds that Sūrjan's son and successor, Bhoja, conquered Gurjara-rāja-bhūmi and defeated the Suhmas, Vaṅgas, Vaidarbhas, Traigartas, Mālavas and the Gāndhāras, and that he was *Dillī-sena-puraskṛta*. This fully tallies with the two following well-known facts in Mughal history:

(1) In 1569 Akbar besieged Ranthambhor and though the Rajput Hāḍā chief, Sūrjan Rao, resisted the invasion at first, he soon concluded a treaty accepting the suzerainty of the Mughal Emperor Akbar. He gave up Ranthambhor and became the servant of the emperor with high honours and office—the government of 52 districts. He was granted a residence in Banaras and appointed Governor of the Province with the rank of the commander of 2,000 as a reward for his military services in Gondwana.

(2) Two of the sons of Sūrjan Rao gave valiant support to Akbar in the expedition to Gujarāt as well as in the Deccan war towards the close of his reign.[2]

There can be hardly any doubt that the military conquests of Sūrjan's son, Bhoja, mentioned in the *Sūrjanacaritam* and quoted above, refer to his fights in Gujarat, Berar (Vaidarbha) and other places as an officer in the Mughal army, as is clearly indicated by the phrase *Dillī-sena-puraskṛta*.

Fortunately we know the dates of these Mughal campaigns. Sūrjan surrendered Ranthambhor, and accepted Mughal suzerainty, in A.D. 1569, and the Gujarāt and Berar (Vaidarbha) expeditions in which his son participated took place, respectively, in A.D. 1572 and 1596. As all these facts are mentioned in the *Sūrjanacaritam* it could not have been composed long before A.D. 1600.

Without going into these details Dr. H. C. Ray justifies his identification of the author of the *Sūrjanacaritam* with Vaidya Candraśekhara on chronological grounds and simply observes as follows: 'This Candraśekhara was a Bengali Vaidya resident in Benares. As Caitanya was born about A.D. 1498 and entered into the *Sannyāsa āśrama* about the end of the first quarter of the sixteenth century, his disciple Candraśekhara was

[1] *History of Bengal*, Edited by R. C. Majumdar, Vol. I, pp. 585–91.
[2] V. A. Smith, *Akbar, the Great Mogul*, pp. 98–100.



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certainly a contemporary of the emperor Akbar and the Cāhamāna prince, Sūrjana. It is thus probable that our author is identical with this disciple of Caitanya. But as yet I am unable to produce any evidence that the *bhakta* was also a poet and an author . . . '[1]

As Akbar had a long reign from A.D. 1556 to 1605, Candraśekhara might have been a contemporary of Akbar during the early part of his reign,[2] but the question is whether he lived up to the end of the sixteenth century A.D. when, as we have seen above, was composed the epic *Sūrjanacaritam*. Fortunately the Vaiṣṇava literature enables us to give a decisive reply on this point.

Dr. Ray's two dates about Caitanya in the passage quoted above are hopelessly wrong. Caitanya was born in February, 1486, not 'about 1498', and he took *Sannyāsa* in 1510, and not 'about A.D. 1525', as stated by Dr. Ray. Further we know that Caitanya met Candraśekhara at Banaras on his way to and back from Vrindāvana in A.D. 1514-15. It is also quite clear that Candraśekhara was at least a grown-up young man at the time, because he told Caitanya that he was tired of the 'Māyā Brahma' and the six schools of philosophy, and pined for the Bhakti cult preached by Caitanya. Even if we assume that he was a young man of 25 when he welcomed Caitanya to his home at Banaras—an underestimate rather than an overestimate—he must have been born about 1490 (1515 minus 25). He must have, therefore, been more than a hundred years old when the *Sūrjanacaritam* was composed—about A.D. 1600, as mentioned above. It is, therefore, difficult to accept the Vaidya Candraśekhara of the Vaiṣṇava literature as the author of the *Sūrjanacaritam* without far more definite evidence than we yet possess. It should be remembered that though there are several references to Vaidya Candraśekhara in the *Caitanyacaritāmṛta* and other Vaiṣṇava books, he is nowhere called a poet—an epithet which the author of an epic poem of more than two thousand verses richly deserves. He is called a *lekhaka* (writer) and *likhana* (writing) is said to be his *vṛtti* (means of livelihood), which probably means that he was a copyist of manuscripts. But this certainly would not be the proper description of a renowned poet. All these considerations make it quite clear that in the absence of more positive evidence it would be quite wrong to claim that the author of the *Sūrjanacaritam* was a Bengali belonging to the Vaidya caste, far less that he is to be identified with the Vaiṣṇava devotee Candraśekhara.

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[1] *I.H.Q.*, XIV, 579-80.

[2] Dr. Biman Bihari Majumdar, an eminent scholar in Vaishnava literature, has expressed the view, in a letter dated 20-3-65, that considering the Vaishnava tradition that Candraśekhara lived to a very old age and Jahnavidevī, wife of Nityānanda, was his guest he might have lived up to the beginning of Akbar's reign.

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# THE OLD TEMPLE AT LAMBA AND KĀMEŚVARA TEMPLE AT AUWA

By M. A. Dhaky

(*Received March 13, 1967*)

Marumaṇḍala is a land of contradictions. In its arid, uninviting landscape grew some of the fairest flowers of Indian temple architecture. In its desolation was nursed a love for the ornate that was and is revealed as much by her people as through its splendid monuments. Not only that; its people were a potential partner in the construction of the rich, impressive façade of the unified cultural edifice, the Western India. Its architectural style with its organized corpus and distinct, settled idiom emerged as a parent to the pedigree of the medieval monumental architecture of the western sector of the sub-continent. Gujarat is as much indebted to Marubhūmi as Rajasthan itself for her culture of the Middle Ages.

Marumaṇḍala, during the latter half of the eighth century, formed the heartland of the Gurjara-Pratīhāras of the collateral branch which, seemingly, was feudatory of the great Imperial line. The earlier Ābhira art of the Maru-land, represented chiefly by the terracottas of the Kuṣāṇa Period in Bikaner area, is strongly permeated by influences radiating from Gandhāra as well as Sūrasena. A little later, the *toraṇa* posts at Mandor suggest the continuity of the same tradition but leaning now more towards Mathurā. In the fourth century Gandhāra became an epicentre of a second powerful wave transmitted with many art motifs to the Gangetic Valley, Sind, North Gujarat, lower Mewar (Mevāḍ) and of course to the nearby Marudeśa.[1] What followed next in Maru-land is not very clear except for the darkness lit up here and there by such rare references as to the existence of the temple of Devī Dadhimatī in 608 at Goth-Manglod in Nagaur District and the rock-cut *vāpī* (step-well) and sculptures carved on the hill-face in 685 at Mandor.[2] But the region came into sharp focus in the last quarter of the eighth century under the aegis of the Pratīhāra Emperor Vatsarāja. The entire Marumaṇḍala now reverberated to the sound of the chisels of the sculptors. Mandor (Maḍḍodara) and Medta (Medāntaka), Osia (Ukeśa) and Abaneri (Ābhānagarī), Buchkala (Rājyaghaṅgakam) and Ghantiyala (Rohiṁsaka), Pipal (Pillalāda) and Dinuduana (Deṇḍvanaka), Khijarpur and Nagaur (Nāgapura), and finally Lamba and Auwa were relatively earlier centres of the homogeneous Mahā-Māru style of architecture. The feudatory Pratīhāra princes of Mandor and the early Cāhamāna chieftains (or some citizens from among the populace) could be the authors of some of these temples: some at least were within their territory and the Imperial Pratīhāras may not have had a direct hand in their erection; but the

[1] Each region assimilated and transformed the new motifs in its own characteristic way.

[2] For information on the early temples in Rajasthan, *see* Agrawal, R. C., *Rajasthan ke Prācīna Devabhavana* (Hindi).



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style, to be sure, was startlingly uniform, differing from place to place only in matter of richness and presence or otherwise of a few features, patterns and motifs.

The analysis of the Mahā-Māru style unravels problems of more than ordinary significance. Despite the presence of a few local traits which refer back to earlier Ābhīra art, and a few elements which could have come through an exodus from Sind after the immobilization of the Buddhist and Brahmanical architectural activities under the Arabs, the style as a whole seems a descendent, unlike the subjacent Mahā-Gurjara style, of the Śūrasena and Central Indian art of the Gupta period.[1] It is not possible at this stage to pinpoint the exact centre or centres of effulgence of this movement to Marumaṇḍala, or to visualize the political circumstances under which such a drive became necessary either. One might fancy Vatsarāja's occupation of Mālava and Kānyakubja and subsequent retreat to Marwar (Mārvāḍ) may have created such circumstances that could facilitate the conduction of the style which we have elected since to call Mahā-Māru. But that is not all. The generic kinship of the temples in this style to (as far in time and place) the early temples in Kaliṅga and the Nāgara Temples in Kuntala-Karṇāṭa area are as well marked out. The Mahā-Māru style is thus a regional variation of the extensive Mahā-Nāgara style of Northern India. At this early stage its relationship with the Mahā-Gurjara style that prevailed in Abu, Mewar and Gujarat is rather of a contemporary but unconcerned neighbour sharing certain characters common to the age. The basic architectonics of Mahā-Māru temple conjure up an image as though it is monolithic. Beauty of masonry is never innate in its structural expressions. It relies for effect on its rich applied decoration, much of which reminds of brick-and-stucco technique. The art of a silversmith and a woodcarver is also apparent in the upper part of the shafts and brackets of certain orders of pillars. The *nāgās* and *mālādharas*, *gandharvas* and *vidyādharas*, undulating creepers, the *ghaṭapallava* and fluted pillars are all derived from the great northern complex of Gupta art.

The temples at Osia, and now Abaneri, are better known. The less familiar but none the less significant are the Old Temple at Lamba and the Śiva Temple at Auwa. On certain aspects they afford information that amplify and enrich our knowledge of the splendid Mahā-Māru style of architecture. They help envisage the vast fund of its imaginative decorations and point conclusively to the original sources of extraction.

## 1. The Old Temple at Lamba

On the trunk road between Jetaran and Jodhpur and next to Bilada is situated the village Bhavi. Lamba is located about 8 kilometres to the west-south-west of Bhavi. It is accessible by a cart road. On the southern outskirts of the village and not far from it is situated the Old Temple.

The temple is built of pink-red sandstone as at Osia, Mandor, Auwa and other Mahā-Māru sites, but with a shade richer and more pleasing tone. On plan it comprises a rectangular Jagatī (terrace) supporting the Mūlaprāsāda (Sanctum Proper) with an open *bhramaṇī* (ambulatory) and a

[1] *See* Jaykar, Pupul, 'Marg', Vol. XII, March 1959, No. 2, pp. 56-57. The learned scholar is perfectly justified in proposing connections between the Gupta art of Deogarh, Bhumara, etc., with the art and architecture at Osia. For the detailed exposition of this theory; *see* Krishna Deva, *Extensions of Gupta Art: Art and Architecture of the Pratīhāra Age*, 'Semina on Indian Art History, 1962, Lalit Kala Academi (Convener and Editor, Dr. Moticha Ira).

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square Raṅgamaṇḍapa (dancing hall) with a Mukhacatuṣkī (entrance porch) to the west. The temple is westerly oriented.[1]

The substantially built high Jagatī (Fig. 2) is of the kind similar to those at Osia and Mandor. Its bold and heavy *vedībandha* (podium) above a *bhiṭṭa* (plinth) is, as in some cases at Osia, of the type where the *kalaśa* (torus major) is omitted. Its wide *antarapatra* (fillet) shows the *tālapatra* (palmette) pattern. Above the *kapotapālikā* (eave-cornice) of the *vedībandha* comes the *Vasantapaṭṭikā* bearing a degenerate acanthus scroll. Both the palmette and the acanthus pattern are known, in fact are fairly frequent, at Osia. Palmette is known at Sarnath as well as at Muṇḍeśvarī Temple (*c.* seventh century) in Bihar. A plain *paṭṭaikā* tops the latter band.

As is common with the temples in Mahā-Māru style, the Mūlaprāsāda (Fig. 1), some 4·14 metres wide, is *tri anga* and thus possesses three projections, *bhadra* (central offset), *pratiratha* (juxta-buttress) and *karṇa* (corner). In its elevational mouldings the Shrine Proper shows a *bhiṭṭa* with a short *kumuda* (torus minor) followed by a heavy *vedībandha* of the *kaṭi* (wall) formed by a *khuraka* (hoof) and *kumbha* (pitcher) splayed out at the base, followed by a *kalaśa* and a negligible *antarapatra* topped by a *kapotapālī* decorated with *candraśālikās* (*caitya* arches) and peacock figures in between the latter on *bhadra* parts.[2] The *bhadra-kumbha* (pitcher) is decorated with a *rathikā* (panel) enshrining Varāha on the north, dancing Gaṇeśa on the west and Garuḍavāhana Viṣṇu on the south. The *jaṅghā* (frieze) above the *vedībandha* is fully carved with divine images sheltered in framed niches, each capped by an elongate *udgama* (pediment), as with Osian temples. Owing to the collapse of the stone facing, except one, all the niches on the east face have vanished, while two have likewise gone on the south side. On the north face are seen (in clockwise order) Gajalakṣmī (on front *karṇa*), standing Viṣṇu (on *pratiratha*), Nṛsiṁha (on *bhadra*), a Siddha (ascetic) and Dikpāli Vāyu (on *karṇa*). On the east, the only surviving image is that of Sūrya on the right-hand *karṇa*. On the south face, the *karṇa* as well as the *pratiratha* has disappeared. On the *bhadra*, Revanta comes to view.[3] He is followed by a Ṛṣi, and Brahmā on *pratiratha*. The sequence of images on the *jaṅghā* poses some serious problems concerning the iconic disposition of *parivāra devatās*. The placement of Gajalakṣmī in lieu of Vāyu, Vāyu in place of Kubera, Sūrya where Īśa ought to have been and Brahmā instead of Nirṛtī are all glaring discrepancies difficult to explain either on the strength of any known text on iconography or architecture, or by any parallel from the contemporaneous Osia.[4] Above the *jaṅghā* comes a short, indifferently rendered, band with buds-and-string in low relief. This is topped by the first *varaṇḍikā* (cornice major) which is similar in appearance and ornamentation to the *kapotapālikā* in the *vedībandha*. Next follows the *kaṇṭha* (neck) wherein are depicted

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[1] For the full view of the temple, *see* Soundara Rajan, K. V., 'Lalit Kala', No. 8.

[2] Peacock figures on the *kapotapālī* are known at Harihara Temple No. 2 at Osia and Brahmāṇasvāmī Temple at Varman.

[3] Revanta is known on the southern face of the subsidary shrine (S.E. corner) of the Sun Temple in Harihara Temple No. 1 complex at Osia. Here the back niche does not show a sun image. At Lamba it is lost. For Osia illustration, *see* Jaykar, Pupul, p. 55, Fig. 7.

[4] The old Sun Temple on the Sachiyāmātā Hill is the only one which deviates in the matter of placement of gods. The orientation of Varuṇa as well as Vāyu, for example, is incorrect. Naṭeśa stands where Kubera ought to have been. On the place of Iśa is found Buddha, and Kubera takes the place of Indra; while Indra himself is totally absent.

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some most interesting tableaux. The northern face preserves almost all of them: these are lost completely on the west; a fragment survives on the south. The worship of Maheśamūrti, *mallayuddha* scene, and three ascetics in panels in the northern *kaṇṭha* are all notable for their dramatic impact. The fragment on the southern *kaṇṭha* reveals a *liṅga pūjā* scene. Above the *kaṇṭha* follows the second *varaṇḍikā*, a little simpler in decoration.

Above the *varaṇḍikā* stands the latina (*ekāṇḍaka*) *śikhara* of the temple. Except for its tallness, it is of the type seen at Osia. The use of *veṇukośa*[1] in lieu of *bālapañjara*[2] above the *pratiratha* is a feature likewise present here.[3] But the *jāla* (lattice) on the *madhyā latā* (central spine) above the *bhadra* reveals the presence of two different and conflicting traditions which perhaps proved an inhibition to the correct engineering, formal stability and organic unity of the spire, which is why, perhaps, its facing stones are now giving way. In fact a large portion of the facing on the east and the south has already gone. The complete collapse of the *śikhara* is imminent. The *śukānasa* (antefix on the fronton) is well preserved. It is formed by a large *śūrasenaka* flanked on either side by a *Nāgara-kūṭa* motif[4] and a *rathikā* bearing a female figure.

The door-frame of the *garbhagṛha* (cellar) is plain save for the *uttaraṅga* (architrave) which displays a *grāsa-paṭṭikā* (band of *kīrttimukhas*) and above it a belt showing architectural decoration consisting of a *Nāgara-kūṭa* alternating with a niche-motif.[5] On the shaft of the two engaged pillars flanking the doorway are seen respectively the figures of Gaṅgā and Yamunā.[6]

The rectangular Raṅgamaṇḍapa is 3·27 metres wide. Its walling starts directly at the top edge of the Jagatī as is the case with several older temples at Osia. Its elevation is made by a *rājasenaka* (fillet) with 'perforation blocks' and *vedikā* (balustrated dado) differing from the normal Mahā-Māru type in appearance as well as in some details. The carved floral patterns on its broad *phalakas* (vertical slabs) are all atavistic to Gupta antecedents. Above the *vedikā* comes a *kapotapālī* functioning here as a coping. This is followed by a plain *āsanapaṭṭaka* (seat). *Mattavāraṇa* (seat-back) members are totally lost though the *gajamuṇḍas* (elephant heads) are found here and there along the post-points. The interior of the hall possesses eight free-standing, square, *ghaṭapallava* pillars. The only one decorated ceiling is in the *mukhālinda*. It is of the *samatala* (flat) type showing a large lotus in the centre. But it is the lintels supported by these pillars that are of considerable significance from art and iconographic points of view. The inner faces of the lintels carry figural and vegetal decorations of surpassing interest. The three lintels within the *mukhālinda* near the *garbhagṛha* are carved with vine patterns. The southern one (Fig. 3) is most exquisite; in form, rhythm and rendering it refers back to the earlier parallel of the Gupta Temple at Bhumarā[7]

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[1] *Rekhā* with *bhūmi āmalakas* serving as internodes is the *veṇukośa*. This part is likened to a sheath of reeds.

[2] Half *latā* above the *pratiratha* or *pratikarna*.

[3] The earlier and the only one instance of this kind is known in Saurashtra. It is the Sun Temple at Pasthar.

[4] On the *phāṁsanā* of the Mukhamaṇḍapa of Mahāvīra Temple at Osia such *Nāgara-kūtas* come to view.

[5] This feature is known above the *uttaraṅga* of the Gupta Temple (*c.* early sixth century) at Deogarh and Viśvakarmā Cave at Ellora; it is known, on a large scale, in the socle of the Old Temple (late sixth century) at Gop in Saurashtra.

[6] The author's memory is not quite sharp on this point. These could be *śālabhañjikās* as is known in the majority of cases at Osia.

[7] Cf. relevant plates, 'Memoir of the Archaeological Survey of India', No. 16.

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and agrees with the contemporaneous ones in the *antarapatra* of the Jagatī of Harihara Temple No. 2 at Osia. In the next bay, on the east and south lintels are found seated gods; while Daśāvatāra are seen on the west, and Gaṇeśa with the Lokapālas Indra, Vāyu, Varuṇa, Yama and Kubera on the north lintel (Fig. 4). These beautiful figures inherit the verve and postures of the gods in those great niches on the Gupta Temple at Deogarh and the contemporary panels in Ajanta Cave XIX. On the *śālā* (nave) lintels are seen scenes from Puranic legends, that on the west face stages *liṅgodbhava mūrti*. The lintels in the following bay as well as in the Mukhacatuṣkī are plain. The eastern end of the hall is open to permit the worshippers to perambulate around the Mūlaprāsāda.[1] The roof above, as normal with early Mahā-Māru temples, is flat.

The problem of the dedication of the temple is quite puzzlesome owing to the absence of cult image and the disappearance of the back niche on the wall of the Shrine Proper. The *uttaraṅga* of the doorway does not carry the normal figure-bearing *rathikās* nor is the *lalāṭa biṃba* (tutelary image) carved. Under the circumstances, the only guide is the carved images on the exterior of the Sanctum Proper and the lintels of the hall. The preponderation of the Vaiṣṇava images and the Dasāvatāra frieze is indicative of the shrine being a Vaiṣṇava one. The presence of Sūrya and Revanta need not worry us since they are known to be associated with the so-called Harihara temples (which are in reality Viṣṇu temples) at Osia. What is intriguing is the absence, unlike Osia, of Kṛṣṇa Līlā scenes in the *kaṇṭha*.[2] What is more, scenes of Shaivaite mythology in the *kaṇṭha* as well as on the lintel-faces are unknown in Vaiṣṇava shrines at Osia. The figures of ascetics are likewise foreign to Osian temples. The cosmopolitan nature of the pantheon may indicate the catholicity of outlook of the builders. The shrine could be a Vaiṣṇava one, but influenced by a Pāśupata sect, or even perhaps a Nātha sect.[3] That is all, of course, speculative. To the archaeologists, art historians and art critics, what is important here are the friezes teeming with figural subjects which are rendered with an acumen and freshness of flourish rare in Mahā-Māru style. The age, as the architecture and the sculptural carving seem to suggest, is late eighth century and thus contemporary with the oldest temples at Osia.

## 2. Kāmeśvara Temple at Auwa

Auwa is accessible from Marwar Junction by a bus; it is some 15 kilometres from the latter place. The Old Temple is situated about half a kilometre north-west of the village, across the dry, shallow river-bed.

The red stone temple comprises a Mūlaprāsāda and a spacious Raṅgamaṇḍapa with a Mūkhacatuṣkī in front. The temple faces the west, as do the two Śiva Temples at Osia.

The Mūlaprāsāda (Fig. 5) is *tri aṅga* on plan and 6·35 metres wide: it is in fact one of the larger temples in Mahā-Māru style. In elevation it shows a *bhiṭṭa* with a short *kumuda* supporting the heavy *vedībandha* where the wide *antarapatra* is decorated with a palmette design. In point of fact this decoration is normally reserved for the *antarapatra* of a Jagatī

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[1] This is a feature characteristic of almost all the Mahā-Māru temples with a Raṅgamaṇḍapa on a Jagatī. This is in contradistinction to Mahā-Gurjara temples.

[2] Kṛṣṇa Līlā scenes are known in the *kaṇṭha* of the three Harihara Temples and the smaller Viṣṇu Temple to the west of the latter group at Osia.

[3] This is the suggestion of Dr. U. P. Shah.

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in Mahā-Māru tradition. The ample *jaṅghā* above the *vedībandha* is graced with the usual Mahā-Māru type of niches with an underlining of *kāmarūpa* (cyma reversa) decorated with lotus petals and a tall *udgama* above. The niches seem like the more refined enlarged versions of those on Harihara No. 2 at Osia. The eight Dikpālas are here found in their appropriate positions on the *karṇas*. Curiously, the *pratirathas* have been left plain. The southern *bhadra* niche harbours Kubera with *gadā* (mace) and *pātra* (cup). Kubera here is *naravāhana* in conformity with the Mahā-Māru iconographic tradition.[1] The western *bhadra* niche enshrines Umā-Maheśvara, while the southern one reveals Gaṇeśa. Above the *jaṅgha* comes the *padmapaṭṭikā* (lotus band), a feature familiar at Osia as well as Roda in Mahā-Gurjara province. The *antarapatra* of the double-corniced *varaṇḍikā* is carved with a chequer pattern with a clarity unknown at Osia.[2]

The superstructure of the Mūlaprāsāda is unusual. It comprises two superimposed series of *śṛṅgas* above each *karṇa*. Each one of these very shapely *śṛṅgas* is neatly carved with *jāla* pattern (Fig. 5). Above each *bhadra* is found a *rathikā* crowned by a series of four 'very delicately carved'[3] receding *siṁhakarṇas* (pediments). At the top, in lieu of a *mūla-mañjarī* on a *mallachādya*,[4] what comes to view is a *dvi bhūma phāṁsanā*[5] crowned by a boldly fluted *ghaṇṭā* of the kind known at Osia on the roof of the hall of Harihara Temple No. 3. The entire conception of the superstructure at Auwa reminds of the Rāṇī Rājai's Temple at Puaṁ Rā'-nogaḍh and Lākheśvara Temple at Kerakot, both in Kutch.[6] This one is albeit the older of the three. The images in the *rathikās* of the superstructure are Kubera, (?) Lakulīśa and Gaṇeśa in the north, east and south respectively.

The impressive door-frame of the Sanctum is of the *pañcaśākhā* variety commencing from the inner *patraśākhā* carved with vegetal creeper followed by *bhūtaśākhā* showing frolicsome dwarfs. Next follows the central *rūpastambha*, *vyālaśākhā*, and finally *bāhyaśākhā* decorated with lotus petals. An additional, exterior, in fact adventitious, *rūpaśākhā*-bearing figure is also found as is known at Brāhmaṇasvāmī Temple (*c.* late ninth century) at Varman.[7] The *uttaraṅga* of the doorway resembles that of Harihara No. 2 at Osia. It shows Gaṇeśa, Brahmā, Śiva, Viṣṇu and Devī in panels.

The Raṅgamaṇḍapa of the temple is square with a *bhadra* transept on the north and south. It is 11·8 metres across the transepts. On its elevation is found a *rājasenaka* with perforated diamond pattern as in Mahā-Gurjara instances. The *vedikā* above (Fig. 6) is carved with beautiful foliate scrolls and arabesques. Above this comes *āsanapaṭṭaka*. The *mattavāraṇa* members are almost lost except for a few elephant-heads of post-points. The *āsana-paṭṭaka* supports, in all, eighteen dwarf pillars decorated with medallions,

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[1] He is Gajavāhana in Mahā-Gurjara tradition.

[2] D. R. Bhandarkar refers to 'two varieties of chequer ornaments' in connection with this temple (see *Progress Report of the Archaeological Survey of India, Western Circle, 1908-09*, p. 49). It seems the learned authority took palmette in the *antara-patra* as chequer.

[3] Sankalia, H. D., *The Archaeology of Gujarat*, p. 254.

[4] The complex super-cornice on which the central spire is placed is the *mallachādya*.

[5] Two-tiered pyramidal roof.

[6] Bhandarkar did compare it with a Kerakot example (*ibid.*, p. 50). In fact this is a typical Mahā-Gurjara trait noticeable in the superstructure of the *prāggrīva* (porch) of Temple V at Roda. This temple is older at least by two generations than the Auwa Temple.

[7] For details, *see* Dhaky, M. A., *Brāhmaṇasvāmī Temple at Varman*, Journal of the Oriental Institute, Baroda, Vol. XIV, March–June 1965, Nos. 3-4.

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volutes, etc. (Fig. 7). In the interior, in the *śālā* (nave), stand four free-standing pillars of the Rucaka class whose upper part of shaft is decorated in the same fashion as the dwarf pillars of the low wall of the hall. Besides these *śālā* pillars, a pair of pilasters is found in the *mukhālinda* (ante-chamber) of the *garbhagṛha* and of the same class of workmanship. The inner faces of the lintels of the transepts and the bay west of the *śālā* bear a continuous *rūpadhārā* (figural belt) comprising a series of figure-bearing large panels. These perhaps contain scenes from the *Rāmāyaṇa* and *purāṇas*. The conception of *rūpadhārā* on the top of the wall inside the hall is known in the Mahāvīra Temple at Osia. A variation of it is known at Temple III at Roda and Brāhmaṇasvāmī Temple at Varman; the convention was carried forward to tenth- and early eleventh-century temples in Western India.

The hall possesses seven important specimens of ceiling that help clarify the typological evolution of certain decorative features so far not found in any other temples in Western India. The ceiling just above the *mukhālinda* is of the *samatala* class divided into nine boxes[1] showing lotuses in round as well as orbicular form. In the northern transept is located an *asmatala* ceiling with a large lotus filling it entirely as is known from several temples at Osia. The *śālā* pillars support a large *kṣipta* ceiling of the Nābhicchanda (concentric) order constituted by courses of *gajatālus, kola*, once more *gajatālus* and, finally, a small archaic *padmāśilā* with *padmākeśara*.[2] The provision for *nāyikās* in the form of supporting brackets attached to the pillars is highly significant in that here one sees the beginnings of that well-known convention not known in that age anywhere else in Western India. The ceiling in the southern transept is of the *samatala* class, once more showing a large lotus flower. The ceiling in the bay west of the *śālā* is once again of the *samatala* class, but with a difference that the central large lotus is placed in an elegantly carved frame which also carries figural strips (Fig. 8).[3] The ceiling in the Mukhacatuṣkī is of the *sama-kṣipta* class and Nābhicchanda order, on an oblong pattern (Fig. 9) such as is known in the portal of Hariścandra-nī-cori Temple at Shamalaji, Mālādevi Temple at Gyaraspur and Brāhmaṇasvāmī Temple at Varman.

The roof of the hall is flat, a feature common with almost all the early Mahā-Māru temples in Rajasthan. As one stands on this roof he notices an upper secret chamber within the superstructure of the Mūla-prāsāda. Ingress is obtained through the *śukanāsa*.

Bhandarkar correctly dates this temple to the ninth century. The advances noticeable in the door-frame, figure sculptures on the *jaṅghā* and the details of the ceilings (when compared with the early temples at Osia) so warrant. In fact it occupies a position half-way between the tenth-century temples and those of the days of Vatsarāja Pratīhāra. The inscriptions engraved on the pillars of the hall date from 1076, 1112 and 1173. The oldest one, as reported by Bhandarkar, refers to the fane as Kāmyeśvara, the other two as Kāmeśvara, by which name it is known to this day.

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[1] The three boxes on the left have disappeared.

[2] For the detailed explanation of the terms used in the context of ceilings, see Nanavati, J. M., and Dhaky, M. A., *The Ceilings in the Temples of Gujarat* (Bulletin of the Baroda Museum, Vols. XVI-XVII).

[3] The ceiling is near in conception to the ceilings of that kind at Roda. The oldest example of a *samatala* ceiling with lotus flowers dates back at least to the Gupta period: the temple at Mukunddara in Eastern Rajasthan, for instance. In the Lamba example, the central gynaeceum circle of the lotus is replaced by a tiny but neatly carved figure of Naṭeśa.

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Auwa is located on a spot from where the border to Mahā-Māru 'style area' is not far. The over-all refinement in the chiselling of the temple may in part be due to the influences radiating from the latter art province. The Mahā-Gurjara land is noted, unlike Mahā-Māru, for its superb masonry work. The door-frame of the Auwa temple is also nearer more to the Mahā-Gurjara conception than to the Mahā-Māru. At the opposite end, counter-influences must have proceeded from Mahā-Māru to the Mahā-Gurjara art area, at least from the latter half of the ninth century. Auwa, by virtue of its location, was privileged to act as the focal centre of such a radiation. The sixth external *mithuna śākhā* in the door-frame of the Brāhmaṇasvāmī Temple at Varman (a typical Mahā-Gurjara temple of the Arbuda school of the late ninth century) and the *gajamuṇḍas* in the *mattavāraṇa* and peacock figures on the *kapotapāli* there, otherwise unknown in the Mahā-Gurjara area, can best be explained by presupposing an 'idea transmission' from the Mahā-Māru region. The Kāmeśvara Temple at Auwa is the premier landmark that presages, and is symptomatic of, the initial though unconscious efforts at the synthesis of the two great styles which, as the time passed and the events showed, emerged as a supreme, fulfilled Mārū-Gurjara style that prevailed from the start of the eleventh century over all Western India.

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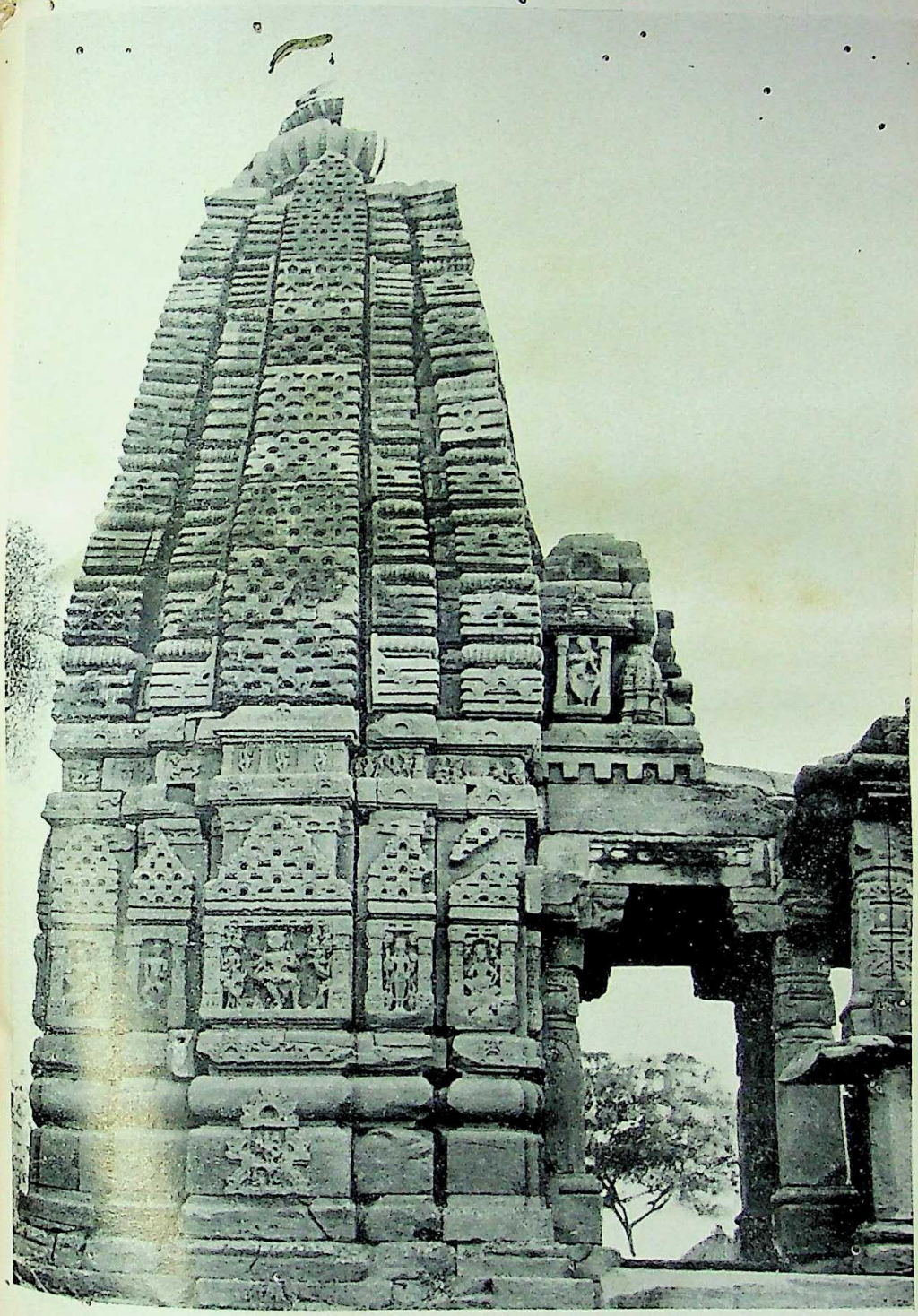

FIG. 1. Mūlaprāsāda, Old Temple, Lamba.

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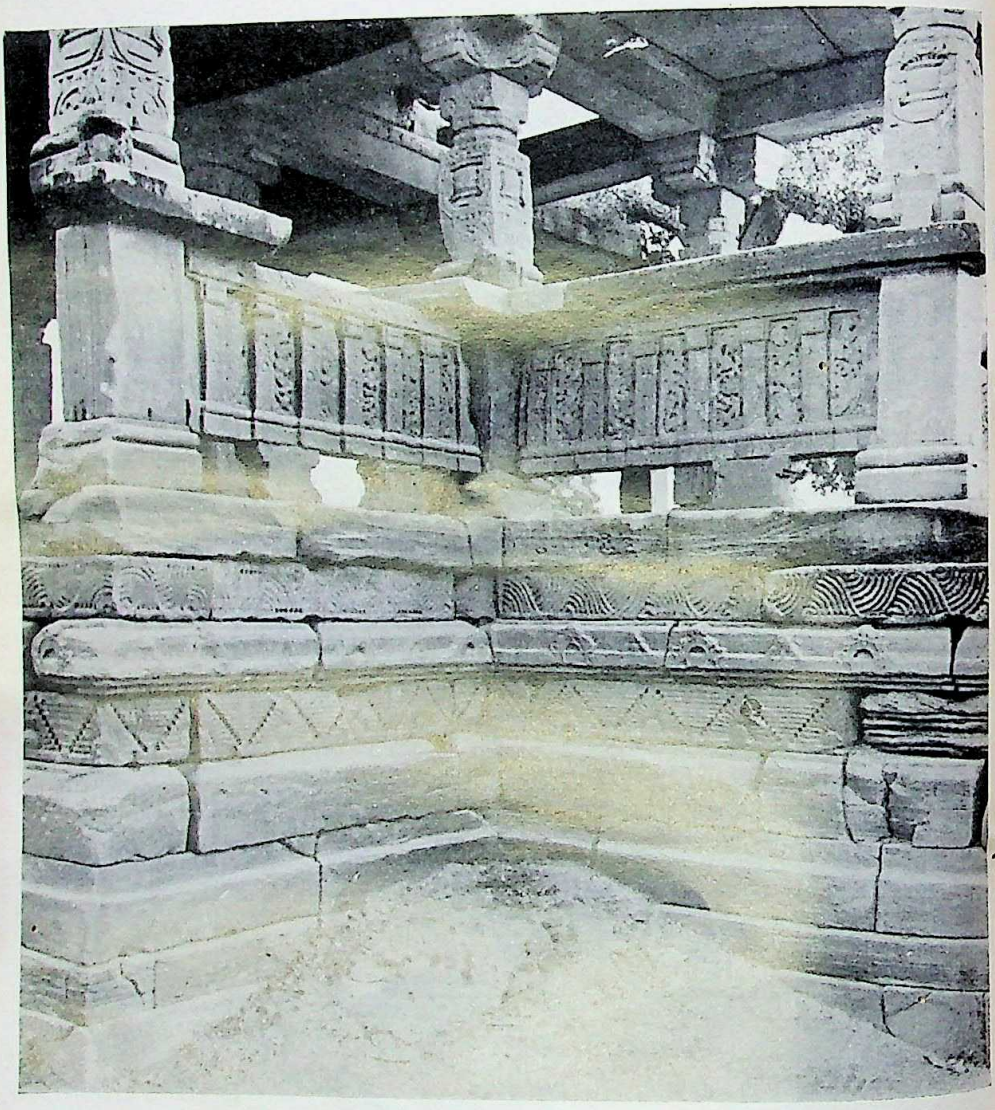

FIG. 2. Jagatī and Raṅgamaṇḍapa, Old Temple, Lamba.

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FIG. 3. Vine pattern on the lintel, Raṅgamaṇḍapa, Old Temple.

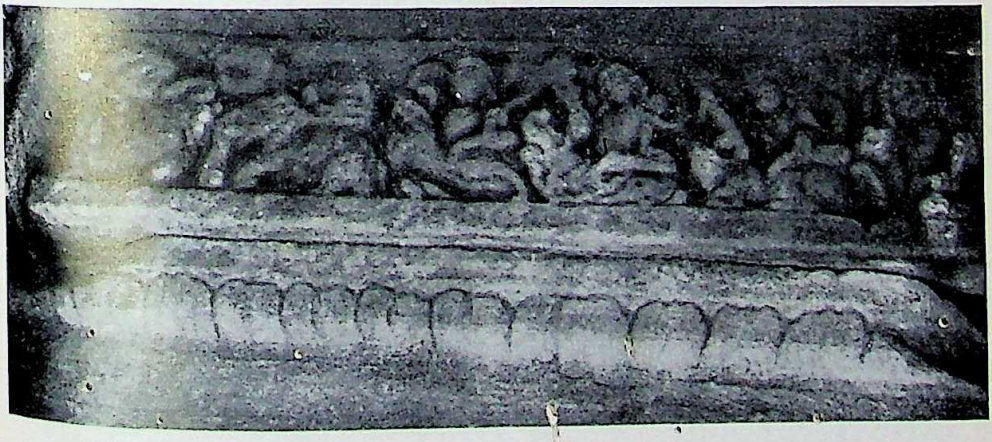

FIG. 4. Gaṇeśa and Lokapālas on the lintel, Old Temple, Lamba.

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FIG. 5. Mūlaprāsāda, Kāmeśvara Temple, Auwa.

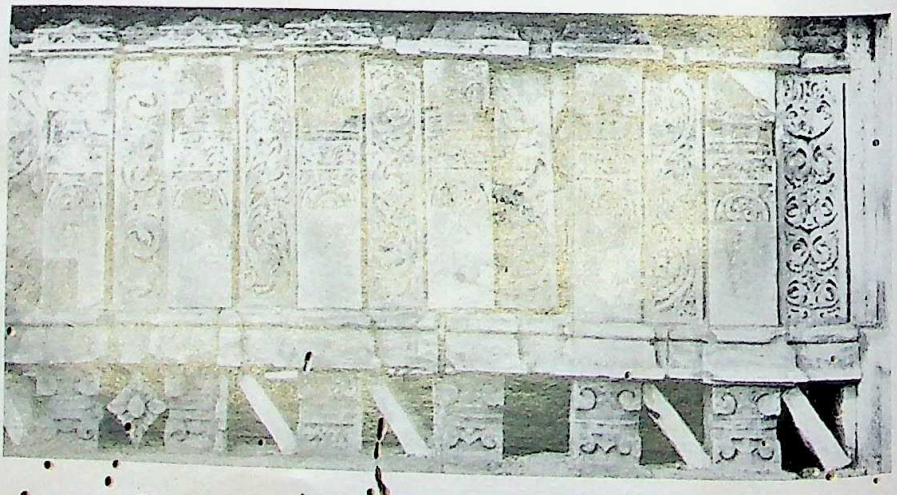

FIG. 6. *Vedikā*, Raṅgamaṇḍapa, Kāmeśvara Temple, Auwa.

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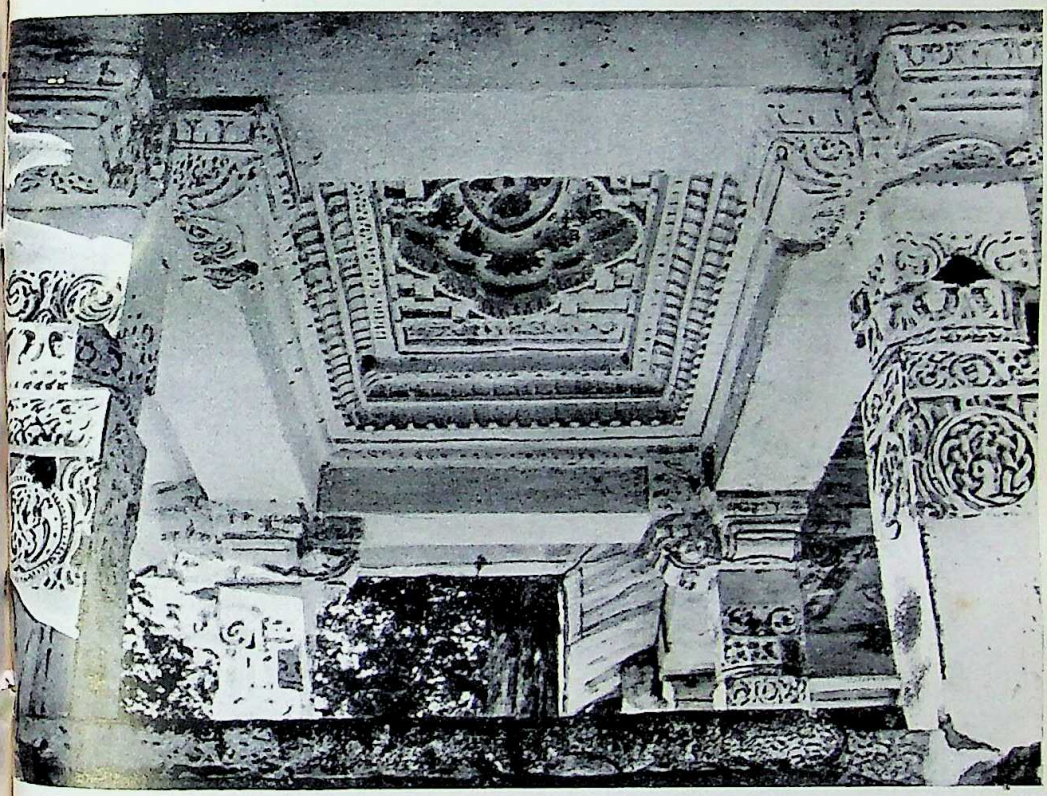

FIG. 7. Mukhacatuṣkī pillars, Kāmeśvara Temple, Auwa.

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FIG. 8. *Samatala vitāna*, Raṅgamaṇḍapa, Kāmeśvara Temple, Auwa.

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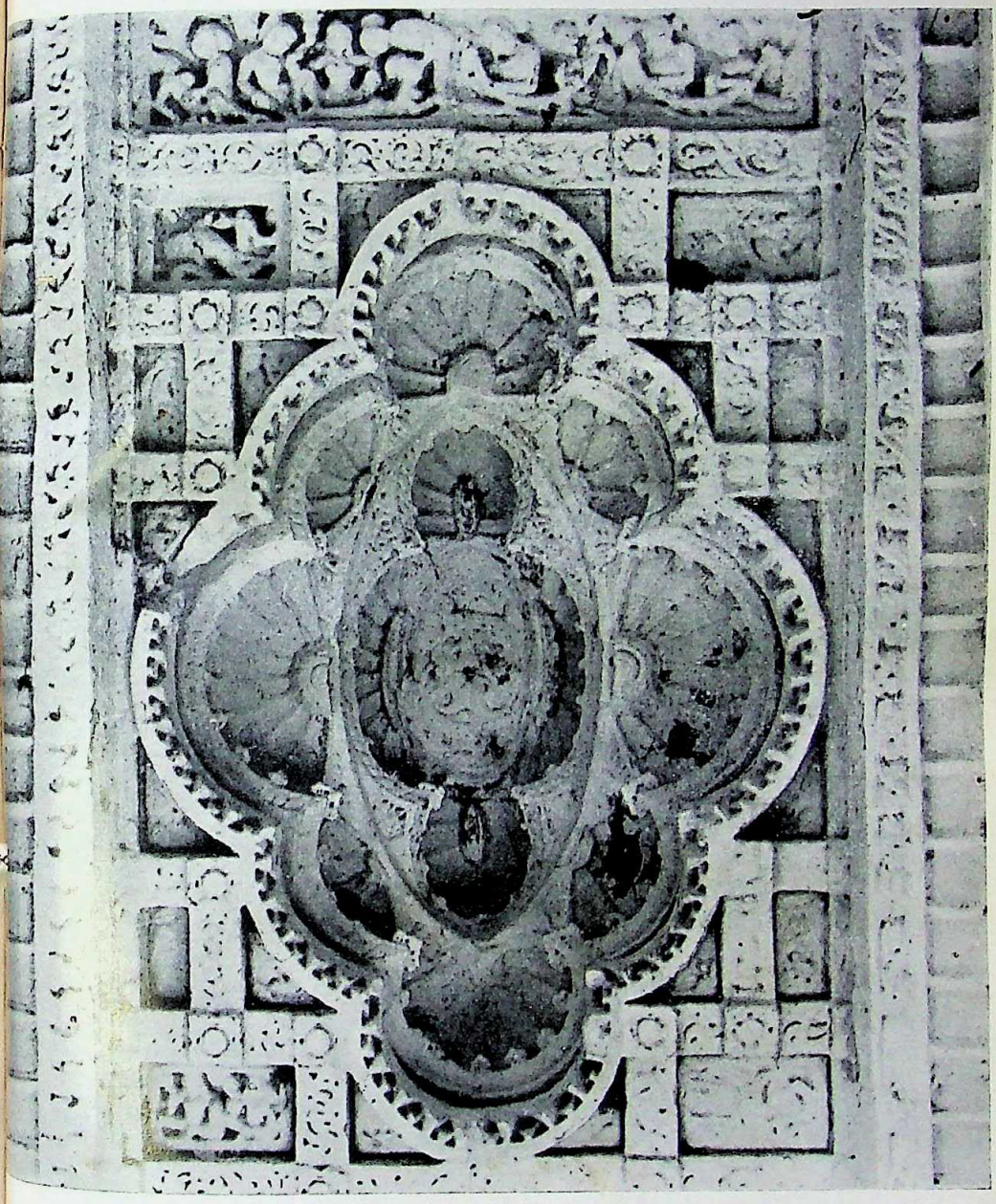

FIG. 9. *Sāmakṣipta vitāna* of Nābhicchanda order, Mukhacatuṣkī, Kāmeśvara Temple, Auwa.

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# CLAY FIGURINES OF THE MUSLIM PERIOD[1]

By Adris Banerji

(*Received June 9, 1967*)

Since historical researches commenced in the eighteenth century A.D. in India, it has been the practice to assume that all native arts and crafts died an unnatural death during the long rule of the Turko-Afghans. From the evidence furnished by the early mosques founded by the Islamic rulers we are in a position to recognize that, forced by circumstances, the Indo-Islamic art had several stages of evolution. A purely Islamic style established itself in the reign of the Tughluqs. In another contribution I hope to show that, notwithstanding the mass conversion and genocide of A.D. 1193, the Hindus survived in Delhi, then known as Dhillika or Yoginipura, and were a thriving and influential community. One of the *casus belli* that Timur invented to justify his invasion was the toleration of the *Zimmis* or the infidels. From the very initial stages at Delhi, Ajmer, Ranthambhore and places like Bayana, we meet with evidence of gradual accumulation of necessary technical knowledge gained by Indian masons habituated to its ornate horizontal tradition about the arcuate architecture of Islam. It has been supposed by many authorities that pre-Mughal paintings did not exist in India. But traces of paintings are met with in the tomb of Hassan Sur and his alleged 'Fort' at Sasaram in the Shahabad district of Bihar. Carr Stephen, who was Chief Judge of the Small Causes Court of Delhi, stated in 1876 that he met with traces of paintings on the dome of the tomb of Firoz Shāh Tughluq at Hauz-i-Khās. These clay figurines from Theh Polār, therefore, are of considerable importance to us in establishing that the potters of India did not cease from making clay figurines after the Muslim occupation. In spite of the great cataclysm and the emergence of a culture complex, the humble potters and doll-makers continued their profession to meet the economic and cultural needs of a new India.

The antiquity of terracotta art is indeed great in this country. India is mainly a riverine country and the silt deposits placed inexhaustible resources at the disposal of its inhabitants, provided they had the necessary imagination. Therefore the 'form' of its various regional cultures have always been distinguished by one trait: clay figurines or terracottas. Since time immemorial, the potters or *kumhārs* were hereditary doll-makers, and the method of preparation of clay figures is an operation which is even now unchanged. Large and small plaques well burnt was a well-known feature of Indian architecture. *Ensembles* of gods and goddesses were created and placed on wooden or bamboo shafts, like the modern images of Durgā, Kārttikeya, Jagatdhātri, etc. Such plaques have been found at Nāgarī (Chitorgarh district), Bhitārgāon, Nālandā, Sārnāth, Kāśipur, Bhiṭā, Basārh (ancient Vaiśālī), Kauśāmbī, Rupar, Rājghāṭ, Patna (Bulandibagh and Kumrāhār) and Ahichchhatrā. In pre-Islamic days these clay figurines served secular as well as ritualistic purposes.

[1] A brief summary of the paper read before the 26th International Congress of Orientalists held at Delhi in 1964.



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They were utilized as icons in the house of people with a small budget. In three temples of Nālandā, huge desecrated images of unburnt clay are found. They were also manufactured as toys for children.

Theh Polār is a village which contained a series of mounds, the ruins of a city or a fortified village, whose history went back to the commencement of the Christian era. The place is located on the southern bank of the Sarasvatī river in the Karnal district of the Punjab. It was a part of the ancient land of the Kurus, like Hariyāṇā. That it was occupied by the Imperial Kushāṇas and then by the Yaudheyas is evident from the find of coins. Later on, possibly due to the Hūṇic eruption, it became deserted, to be re-peopled by the Turko-Afghans. Examination of the mounds in 1933-34 led to the exhumation of a fortified place with four bastions at the four corners. The very first stratum yielded pottery consisting of glazed ware and unglazed ware in abundance, as at Adilabād, Hastināpur, Rupar and Lāl Koṭ or Rāi Pithorā. This stratum was objectively dated by finds of hoards of coins from the reign of Sultan Shāmsuddin Iltutmish (*c.* A.D. 1210–35) to the reign of Firoz Tughluq (*c.* A.D. 1351–88) testifying to the fact that Theh Polār flourished up to the end of the fourteenth century A.D.—at least a period of 178 years—that is, at a time when storm clouds were gathering on the north-western horizon of India, from the steppes of Central India, where a Mongol boy had grown up through persecution and adversity and was shortly to arrive on the banks of the Indus at Attock in pursuit of Jālāluddin, the Crown Prince of Khawarizm. History knows him as the Buddhist Chenghiz Khān. It was one of the Mongol inroads that must have put an end to Theh Polār.

In this stratum were found a large number of clay figurines of animals, one human figure and a clay cart of unique design which might have been actually used in the rural areas of southern Punjab. The technique also does not show any violent break from tradition. The first was the preparation of clay. In pre-Islamic days, sometimes *degraissants* were used to counteract the contraction of the clay during firing. Next was the process of manufacture. Since time immemorial two systems are met with, both fashioning by hand and moulding (that is, by use of moulds). Assimilation and absorption of intruding alien traditions have also been noticed in terracottas of Barodā, Pātnā, Ter, etc. Sometimes double moulds were also used. The figurines of Theh Polār, however, do not betray any complex manufacturing process. They are what may be called crude and primitive to a degree. All are solid and were modelled by hand. Portions were treated by a sharp-edged tool or iron instrument. The clay in virgin condition had a certain amount of sand, and the damaged pieces show a grey core betraying bad firing. Finally the finished products received a red slip. The figurines of horses found in the fifth city of Hastinapur, in Meerut district, which also belongs to this period, were hollow. But at Theh Polār (Fig. 1) all the examples are solid. The eyes are treated by 'applique' method. That is, circular pellets of soft clay were pressed on the main body and the centre punched with a sharp-pointed instrument. The wavy manes were made by parallel indentations.

Amongst the animal figurines found were horses, bulls of two types, (Fig. 2) one large (*Bos indicus*) and the other a short-horned one, composite animals, rams, horses with riders, a human figure and last but not least a clay cart (Fig. 3). Clay carts (*mṛicchakaṭika*) have been known since the palmy days of Harappan culture in the millenniums before the birth of Christ. Fine representations of carts have been met with in stone relief up to the sixteenth century A.D. But in design and quality this is a unique piece. It has four wheels on four axles at four corners. But the

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rims are merely rings of clay and spoked like those occurring on the Asokan capital of Sārnāth, not solid like those of Harappa and Mohenjodaro. The upper structure consists of circular arches with a domical roof having a ridge at the base, topped by a finial. On the front is the head of a deer (?).

Another abnormality is the treatment of the lower lips of the horses which, like those of the camels, have been shown protruding.

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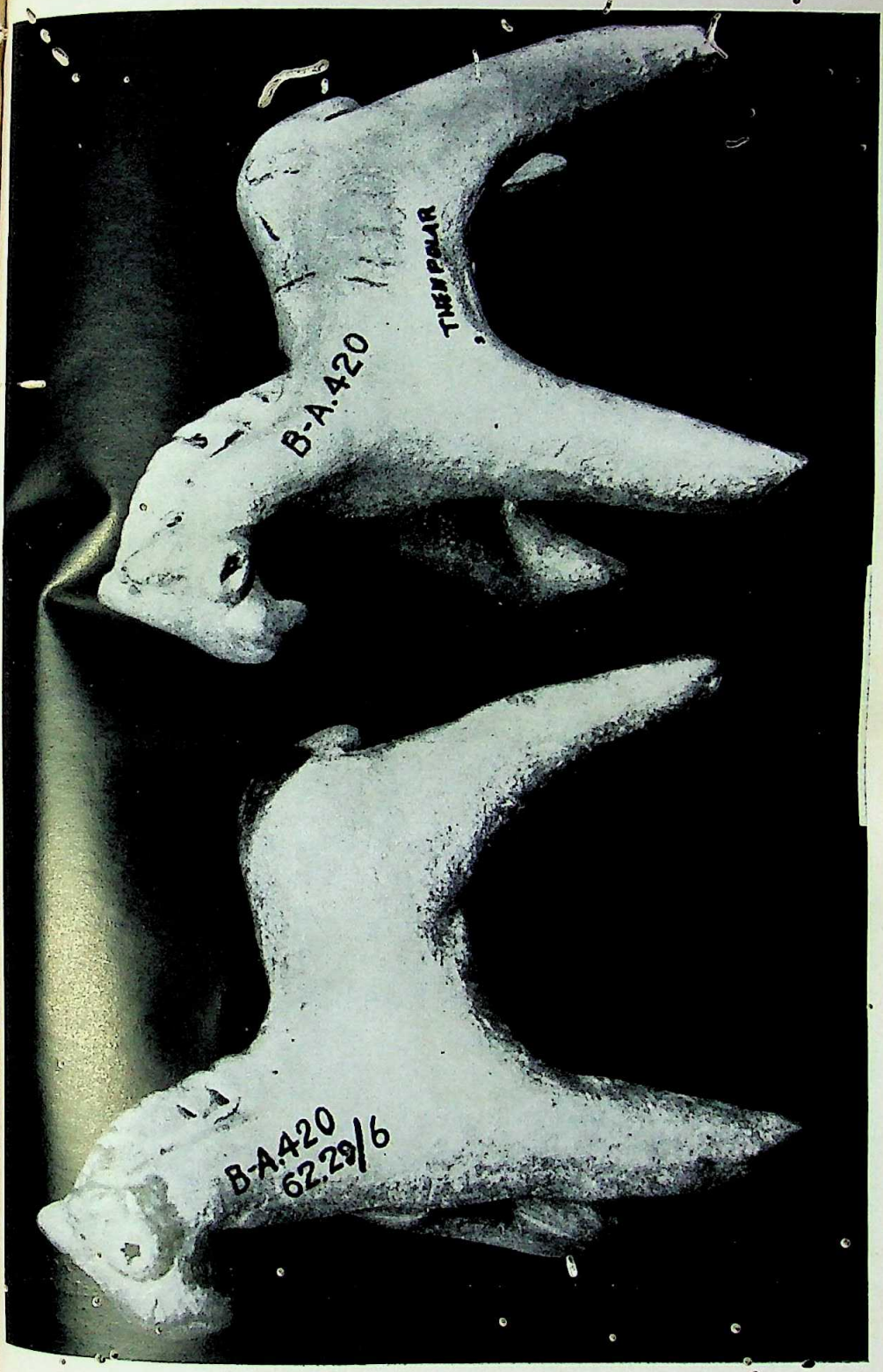


FIG. 1. Two clay figurines of horses from Theh Polār, Ambala district (*c.* thirteenth century A.D.).

*Courtesy: Archaeological Survey of India.*

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Courtesy: *Archaeological Survey of India.*

FIG. 2. Miscellaneous clay figurines, including those of bulls, from Theh Polār, Ambala district.

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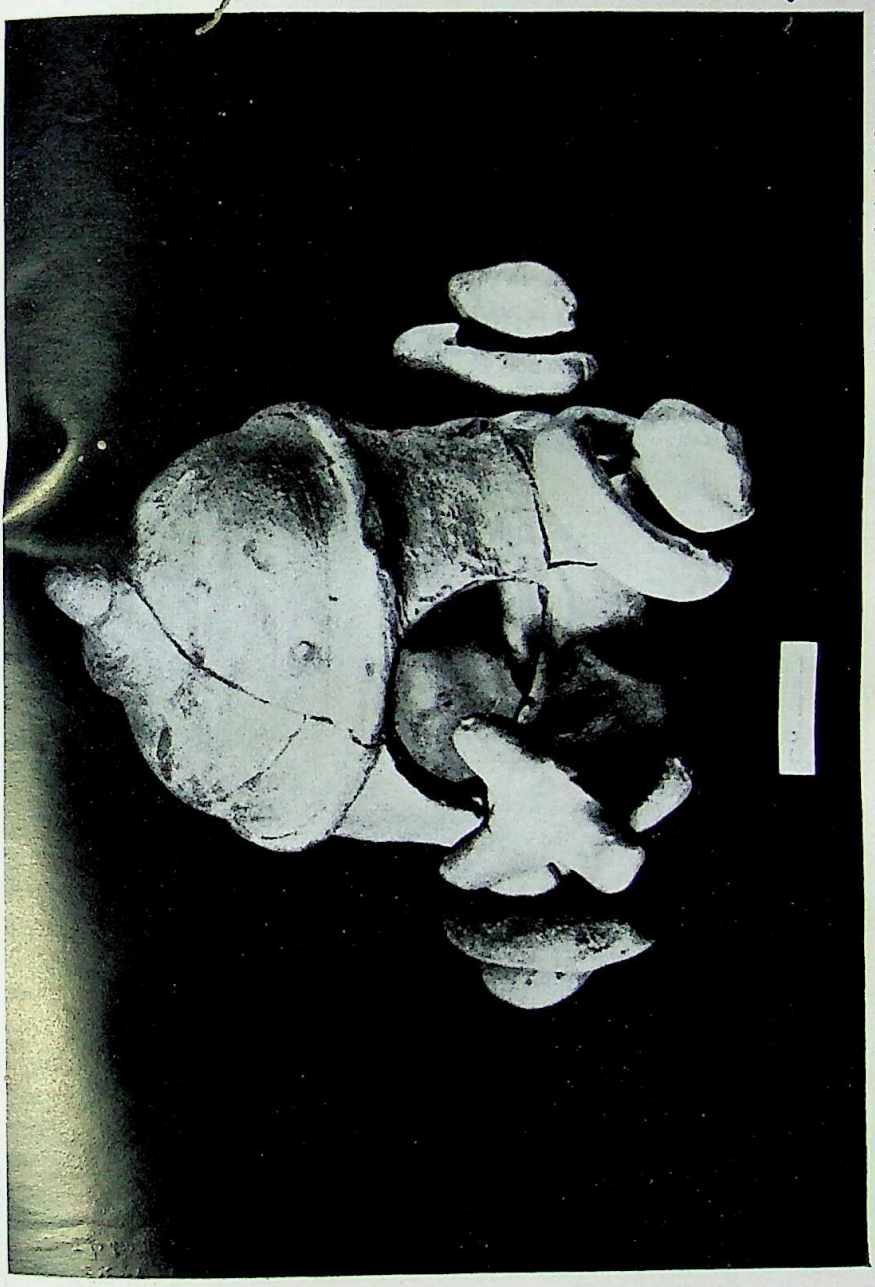

*Courtesy: Archaeological Survey of India.*

FIG. 3. A clay cart from Theh Polār in Ambala district (c. thirteenth century A.D.).

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*Courtesy: Archaeological Survey of India.*

FIG. 4. An ageless type of human figurine from Theh Polār in Ambala district (*c.* thirteenth century A.D.).

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# THE LEDGER OF THE MERCHANT HOVHANNES JOUGHAYETSI

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(Communicated by Professor Suniti Kumar Chatterji on 7th November 1966)

On 19th December 1682 (7th December, Old Style), a contract was signed in Nor Jougha between the sons of Khoja Guerak-Zakaria and Embroomagha on the one hand and the merchant Hovhannes, son of the priest David, on the other. According to this contract Hovhannes received from the above-mentioned brothers, Khojas, English broadcloth, about 217 *tumans* worth and a small amount of ready money (in all 250 *tumans*) for trading in India, on condition that he should get one-fourth of the profits.

This agreement was concluded according to and with due account of long-time legal traditions prevailing among the Armenian Khojas. A few decades later, in 1765, those traditions found their way into the 'Code of Law' compiled by the Armenians of Astrakhan as 'established and verified canons of law'.[1]

This code of law of the Astrakhan Armenians and particularly its XIV chapter entitled 'On the Rights of the Tradesman' is completely devoted to the mutual relations between the Khojas and their employees and the obligations each contracting party was to assume (the Khoja is named here *Agha*, while the merchant trading with his money—*partner*). The 11th clause of the foregoing chapter reads as follows: 'Every partner is bound to enter, each dealing in a lawful ledger, truthfully and in time.' 'And if', the text goes on to say, 'a *partner* fails to submit a ledger to his master, he will be jailed, fed on bread and water alone and, at times, whipped, for a period of up to one year', etc.[2] The employee, named *partner*, must return to his place at Agha's first instance, and 'render an account before the partnership', or else 'whatever the profit of the partner, it will be appropriated by the master or whatever the probable loss, it will be incurred by the partner alone'.[3]

It can easily be realized that the legal terms were formulated in the economic and class interests of the Khojas. In other words, the employee-tradesmen were the servile executors of Khojas' will. Similar is the case with Hovhannes, son of the priest David, who, in observance of the above-said terms of the commercial code of law, compiled minutely the 'ledger' of his business transactions (called *Roozlama*), in addition to summary reports dealing with the purchase and sale of particular goods (called *kata*). The book covers the period of his 11-year long and tiresome commercial activities, beginning from 19th December 1682, until 6th December 1693.

This valuable ledger is now preserved in the Manuscripts Department of the National Book Depository in Portugal and is known as book F.G. 7970. It is made up of 44 separate leaves,[4] one placed over the other, each 18 cm.

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[1] The Mashtots Matenadaran (Yerevan State Research Institute of Ancient Manuscripts), MS. No. 7383, p. 57*b* and sq.
[2] *Ibid.*, p. 59*a*.
[3] *Ibid.*, p. 59*b*.
[4] The pictures taken from the micro-film are inadequate in determining the exact number of the leaves in the ledger. They vary between 42 and 44.


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wide and 54 cm. long. Every leaf is filled on both sides with small-lettered accounts (they used to write on such narrow and small leaves in Tibet and in other countries of the Far East).[1]

In his letter dated June 1961, Mr. Robert Gulbenkian informed us of the ledger. Thanks to his initiative, the Kalust Gulbenkian Foundation put out in recent years a number of original writings and lists of manuscripts in Armenian that are of significant value in Armenology. Some time later Mr. Robert Gulbenkian kindly placed a micro-film of the ledger at the disposal of the Mashtots Matenadaran in Yerevan. We printed pictures of the film and laboured for two years before we could decipher this extremely illegible, and, in certain places, complicated and incomprehensible writing. H. Papazian, a candidate in history, was of great help in deciphering the manuscript, and especially in elucidating the sense of hundreds of Persian words and terms. He will take part in preparing the publication of the ledger that will be provided with an analysis (in the form of an introduction), notes and an extensive vocabulary. We should attempt in the present paper to give an outline of Hovhannes Joughayetsi's ledger, throw light on its significance as a unique reference source treating of the trade of Armenians residing in Nor Jougha as well as of the history of the economic life in India, Nepal and Tibet.

## I

The ledger begins with the following opening paragraph: 'In Jougha, a suburb of Isfahan, on the 22nd of the month of Hamira, 1131 (63 Azaria Style), i.e. in 1683, I entered into partnership receiving a capital of 250 *tumans* in all from Khojas Zakar and Embroomagha, sons of Guerak. By God I may take the sum to India for trade and three-fourths of the profit (apart from the capital) God gives will go to the masters, the rest—one-fourth—will be mine, Hovhannes'. May God keep me aloof from danger. Amen.'

To begin with, we should like to dwell on what we know of Hovhannes' masters, the dynasty of Khoja Zakar and Embroom. A number of richly illustrated data are to be found in a gospel. The latter was copied in 1644, the order being placed by Tsaghik, the mother of Zakar and Embroom, in memory of her late husband, Guerak, son of Embroom. The commemoratory note of the gospel mentions the male members of the Gueraks: 'I supplicate to mention in your prayers to God the humble-spirited Christian and Christ-worshipper, Guerak, and his industrious sons, Grigor, Erestam, Embroom, Zakar, Margar and Pir-Atam, the young-yeared son of Grigor.'[2]

We have information elsewhere of the eldest of Guerak's five sons—Grigor. Two noteworthy medals are kept in the Medicean collection of the Bargello Museum in Florence. The obverse of those medals represents the image of an Armenian merchant, full-length and half-length respectively. The reverse is impressed with 'God's lamb', a lion to the left of it and the sun rising from the lion's back (the coat-of-arms of Iran which ostensibly indicates the native country of the represented person). Below the 'God's lamb' a beehive is pictured on both medals with a swarm of bees making straight for it.

The obverse of both the medals are engraved with circular inscriptions which took us painstaking work to decipher (we have only pictures of the medals at hand):

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[1] N. V. Kyuner, Opisanie Tibeta, čast' vtoraya, etnografičeskaya, vypusk I-ni bostav i byt naseleniya, Vladivostok, 1908, p. 117.

[2] The Mashtots Matenadaran, MS. No. 6665, p. 281*b*.



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(A) (*Obverse*) : Grigor, son of the Mirmanents Guerak.
(B) (*Reverse*) : Our Lord Jesus; the Lamb of God that bestowed manna on us in the year 1673.[1]

Accordingly, the merchant pictured on the medals must be the elder brother of Khoja Zakar and Embroom Agha, Grigor, who was a resident of Italy. In accordance with GH. Alishan's data, an Armenian family called Guerak-Mirman did in fact live in Venice in the seventeenth century.[2]

The dynasty of the Gueraks lived in the quarter of the church 'Sourp Asvatsatsin' in Nor Jougha. (The above-mentioned gospel of 1644 is dedicated to that church). Referring to the history of that quarter H. Ter-Hovhaniants, well versed in the past life of Nor Jougha, took notice of a certain Khoja Guerak whose 'commercial arms stretched over Europe and in the direction of Astrakhan and Guilan'.[3] This Guerak, however, differs from Guerak the father of the Khojas under consideration, yet he must be a descendant of the same line and should be the nephew of the senior Guerak or a close relative.[4]

'The commercial arms' of Khoja Zakar and Embroom Agha also extended the world over. The tradesmen who had entered upon the field of commerce with the capital of the Khojas had access to the important trade centres, from the Levant to the Tibetan capital (Lhasa) and the Chinese trading centre Sinin.

With reference to the medals, we have already spoken of the hive with a swarm of bees making straight for it. In the opinion of A. Sakisian 'it is an allegory of labour and extensive activities'.[5] Nevertheless, we believe that we might be nearer the truth if we perceived in the engraved hive the treasury of the wealthy sons of Khoja Guerak, whereas the swarm should be reminiscent of the host of employees who wandered from one country to another, crossed 'hair's bridges and hellish tracks'.

Scanty are our data on the author of the ledger, Hovhannes, son of the priest David. He was well conversant with the systems of measures and weights in practice in various countries, the different monetary units and the weight of gold and silver each of them contained. He unerringly solved complicated arithmetical problems relating to the sale of various goods, bank and money transactions, at times quite involved. The entries in the ledger abide by accepted principles in book-keeping; the right-hand margins of leaves display expenditures noted after each credit item, while the left hand is taken up by incomes. His consistency in the use of figures deserves special mention.

All of these facts evidence that our merchant had had a sound training in some specialized establishment, prior to taking up trade.

During Hovhannes' business activities, such an establishment did in fact exist in Nor Jougha—the trade school run by Kostand Joughayetsi. It has a record of 250 'leavers' (ex-students who came out of the school) who were taught 'arithmetic, simple reading, clerkship and, in the main, instructions on trade'.[6]

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[1] Arménag Sakisian, pages d'Art Arménien, Paris, 1940, Plate XLIII (*op. cit.* for an inadequate examination and decipherment of the medals, pp. 115–26).
[2] GH. Alishan, Hai-Venet., p. 50 (in Armenian).
[3] H. Ter-Hovhaniants, *A History of Nor Jougha a Suburb of Isfahan*, Vol. I, Nor Jougha, 1880.
[4] The father's name of this Guerak (died in 1708) is Hakob, who had two sons, one of whom was called Hakob, too. (*See* H. Ter-Hovhaniants, *op. cit.*, Vol. I, p. 301, Vol. II, 1881, pp. 186–96).
[5] A. Sakisian, *op. cit.*, p. 115.
[6] H. Ter-Hovhaniants, *op. cit.*, B, p. 253.

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When we compare the *Manual for Trade* Kostand Joughayetsi had compiled for his pupils with the 'ledger' of Hovhannes, every doubt as to Hovhannes having been a pupil of that school is dispelled.

Before his business mission to India where he went with the capital of Guerak's sons, Hovhannes had been to Turkey on business errands. This is proved by an entry in the ledger that reads thus: 'While going to Izmir we have lent money to Mooradkhan; the sum was returned in Bursa.'

As pointed out, his dealings in December 1693 form the concluding chapter of the ledger. At the time Hovhannes was in Calcutta, on his way back from Tibet, from where he went to Hookley (Hoogley). No information has as yet been available on his further wanderings.

In the writing quoted above, H. Ter-Hovnaniants, who had at hand the valuable documents from the rich archives of Amenaperkich Monastery, enlists the names of 75 merchants who lived in the Meidan quarter of Nor Jougha in 1702. Numbers 19 and 20 of this list are taken up by brothers Hovhannes and Alam Ter-Davitian. We believe the first of these names is of our merchant, Alam being his younger brother. We have no notion of the whereabouts of Hovhannes in 1702. We are also unaware of the place where he breathed his last. The national book repository of Portugal is ignorant as to how Hovhannes' ledger has found its way there. Had not the lot of a tradesman taken him to that part of the European continent where he had closed his eyes away from his native place, under alien skies? Those are as yet open questions that will, presumably, be answered following a scrutiny of the archival documents preserved in Nor Jougha and elsewhere.

## II

On 19th December 1682, Hovhannes, son of the priest David, leaves Nor Jougha, a suburb of Isfahan, for Bandar-Abbas with the aim of making a voyage to India. Let us follow his itinerary, producing at the same time data concerning the main items of his dealings.

We know already that the reason of Hovhannes' voyage to India lay in his intention to sell the 738 metres of red and green English broadcloth he had got from Khoja Guerak's sons (18 pieces of red and green narrow broadcloth, in all 726 gazes and 6 grehs).[1]

In addition to the broadcloth Hovhannes was given a note of hand to the effect that he was bound to receive in Shiraz from Mr. Avetik, son of the pilgrim Petros, 29 *tumans* in cash. One *tuman* was allotted for buying the cloth (felt cloak and *varpoush*) used for wrapping the bales of broadcloth. Hovhannes was given in all two *tumans* 8,500 dians of ready money.

To get to the sea, Hovhannes takes the Isfahan-Mahear-Yezdekhas-Shiraz-Lar-Bandar-Abbas route.

On the 6th of February 1683, he reaches Bandar-Abbas. A few days later he sets sail for India on board the *Sleman*. 'In the year 1132 (i.e. 67, Azaria Style) on the 21st of the month of Nirhan (i.e. 21st of March 1683), on Friday, the ship, *Sleman*, cast anchor at the port of Bandar-Surat and on 23rd March, Sunday, we came ashore in Bandar-Surat; God give us a good guide: Amen': so Hovhannes writes on his arrival in Surat.

On 30th March the goods were taken from the warehouse of the port not by Hovhannes ('for I did not know the language') but by another employee of the masters, Nazaret by name.

[1] The paper is provided with comprehensive lists of measures, weights, commodities, monetary-units, etc., mentioned in the ledger, that have no English equivalents. Thus the original names are preserved in English transliteration.

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The ledger contains some important data on the Armenian colony of Surat. Here Hovhannes spends the Easter holidays, makes presents to the Armenian church and meets, on various occasions, his compatriots to have dealings with them. The latter include Nazaret, Simeon, son of Khachik and brother of Movses Hovan, Markos son of the Topchents Poghos, Mooradkhan son of Gharagogh, Voskan Aguletsi, Toomajan son of Atom of Van, Gasbar Shambetsi, Martiros son of Eldram, Mekertoom son of Khanoomaghents Hovhannes, Galoots son of Panos the Mousheghs, and Manvel.[1] Besides, Hovhannes has dealings with the local middle-men—Trikam, Madan and Gooliat.

He leaves Surat on 15th May 1683, and on the 29th of the same month gets to Aurangabat[2] from where he departs on the 15th of July to arrive, on the 21st of the same month, in Burhanpur, where he meets a certain Shorents Tatos who collected money for the church in Shiraz. Accompanied by Baghoom from Erevan (i.e. the region of Erevan in Nor Jougha), he starts off and comes to Sironj on 11th August, where he stays for two and a half months (he leaves the place on 24th November). Here he makes mention of Aghazar and an Armenian deacon (whose name is not given).

He leaves Sironj, via Kashgar, for Agra (his transcription of the city is 'Ekra') where he arrives on 2nd December. In the years 1527–1658 Agra was the capital of the Moghul Empire and commercially the most thriving and prosperous city of India. 'Agra was at the Empire's crossroads that radiated in all directions like the spokes of a wheel', writes an English traveller.[3]

Armenian tradesmen lived for long in Agra. They had their church and permanent community. In the records of the ledger Avetik, son of Petros of Shiraz, figures as the main person with whom our tradesman enters into various dealings.[4]

In company with Baba, son of Panos, Hovhannes sets out on 6th January 1684, from Agra to buy indigo in Khurja. He returns to Agra on 13th March, bringing along 92 *charms* (over two tons) of indigo. He writes the following in this connection: 'On the 16th of the month of Nirhan I came to Ekra with 92 *charms* of indigo. Mr. Avetik was head of the transaction. Of the 92 *charms*, 34 were taken for Hovhan, Baba took 42 *charms* and Hovhannes took 16, so that we should go to cast dies in Surat.'

Hovhannes goes away to Surat on 21st March and arrives in Sironj on the 29th of the same month (where he meets Stepan, son of Dilak). Two days later he leaves Sironj for Surat where he gets on 12th April.

He ships the above-mentioned 16 *charms* (368 kg.) of indigo and seven bales of *serinj* and four bales of *dergaz* and authorizes his 'fellow-employee', Hovhan of Shiraz, to take part of the goods to Isfahan and the rest to Basra for sale.

On 29th May 1684, Hovhannes leaves Surat for Agra where he arrives on 13th December of the same year via Aurangabat-Berhampore-Sironj-Lashkar, making prolonged stops in all of those places (particularly in

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[1] We are also listing those names which Hovhannes makes mention of on his second visit to Suram (in the spring of 1684).

[2] The names of places are given mostly in the transcription of Hovhannes, quoting at the same time their correct forms.

[3] K. A. Antonova: Očerki obščestvennix otnošeniĭ i političeskogo stroya Mongol'skoĭ Indii vremen Akbara (1556–1605), Moscow, 1962, p. 121.

[4] One of the gospels, well known to us, mentions the relatives of Tsaghik, wife of Khoja Guerak: 'Remember again Tsaghik and her sister, Siprik, and her son, Avetik' (Matenadaran, MS. No. 6665, p. 97*b*). If this name is to be identified with Avetik, the son of Petros of Mahdas, the Khoja residing in Agra should be assumed to be the nephew of Zakar and Embroom Agha, Hovhannes's masters.

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Aurangabat). Ten days later he goes to the cities of Khairabad and Lahurpur entrusted with the mission of buying stuffs called *bardar* and *kherabad*. This transaction takes up a new chapter in the ledger, the introductory part of which reads as follows: 'May God give us good luck: Amen. On the 26th of the month of Hamira I came to an agreement in Ekra with Mr. Avetik to go to Khairabad and Lahurpur to buy up to 12,000 lengths of *bardar*. In Ekra the price is to be paid by Mr. Avetik, I shall go there to make preparations. Half of the bargain will go to Poghos, son of Hovhan, and the other half will be mine. On the 26th of the month of Hamira I started for Khairabad and Lahurpur.'

Hovhannes fulfils his task with success. He buys 102 bales of *kherabad* in Lahurpur (each bale measuring 106 lengths). He brings the goods to Agra on 2nd November 1685; 50 out of the 162 bales he takes for himself and gives the rest to Mr. Avetik, meant for Hovhan of Shiraz.

On 21st January 1686, Hovhannes sends his share of *kherabad* to Surat where 'Hovhan of Shiraz, son of Poghos of Khassan, has the right to sell at his discretion for we are partners', writes he.

The foregoing entries on his business transactions are followed by the most informative and interesting part in the ledger:

'Hovhannes, son of the priest David, signs an agreement with Hovhan of Shiraz, son of Poghos (Hovhan was not in Agra, Mr. Avetik acts on his behalf), on 10th February 1686, undertakes the most distant and longest journey to Tibet (he transcribes it as Butand, i.e. Bhotanta or Bhotan).'

The introductory part of the relevant chapter in the ledger contains essential facts on the relations of the merchants involved in this newly-founded commercial company and on related matters. The share of every participant in the company is 4,685 rupees and the total investment in the company comes to 9,370 rupees (106 kg. 227 g. of silver).

It becomes evident from the numerous entries in the ledger that our Hovhannes (like his friend Hovhan, son of Poghos) undertaking of his own this business continues to be dependent on his *sahibs* (masters) in Nor Jougha.

Naturally he is no more the capital-divested employee of Khoja Guerak's sons who had come four years ago to India to sell his masters' 18 pieces of broadcloth and get the one-fourth of the profits. Now he has his own capital but is linked with his masters with unbreakable ties as an employee of the Guerak Commercial Company. Even in Lhasa, the capital of distant Tibet, he never forgets this fact, which is borne out by the following lines: 'We are wholly the servants of our masters who may settle our accounts as they choose.' He prays God not to disgrace him before his masters, to have pity on him and keep him aloof from trials.

In Tibet, as well as in other major centres that lay on his route, Hovhannes buys many sorts of goods for sale; they include in particular, precious stones such as 365 *sers* (323 kg.) of amber, 11·47, 5 *tanks* and then again 823 *tanks* of seed-pearls (32 kg. altogether), 273 pearls, 96 sard-made beads; 24 lengths of dress from *palankpoosh*, 72 lengths of various sorts of calico, 16 lengths of stuff and many more goods worth 8,216·5 rupees (about 94 kg. of silver) in all.

To take all those goods to Tibet Hovhannes hires two servants in Agra—Poghos, son of the priest Petros, with an annual salary of 50 rupees in addition to food and clothing, and Ghamash Petros, on the same terms, but his salary amounting to only 40 rupees. Both he and his servants were armed with weapons. There are two entries in the ledger that speak of buying powder and bullets.

As we have pointed out our merchant leaves Agra on 12th February 1686. In the city of Shikohabad he joins the caravan bound for Patna

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and passing through the cities of Makhanpur, Jahanabad, Benares and Shahzadpur he reaches Patna (which he transcribes as Patana) on 9th March of the same year.

There is a substantial community of Armenians also in Patna. On various occasions Hovhannes has dealings here with Armenian and foreign tradesmen, some of whom he mentions in his ledger: Master Petros, Khachik son of master Grigor, Chakuch Hakobjan, Murat, Petros grandson of Kachal Tsatoor, Vartanes son of Stepan, the French Mussidarvan, his son Panos, and servant Manvel, middle-man Enoob, and the commercial company of the Valandz.[1]

In Patna Hovhannes is the guest of an Armenian priest. In the city he buys more goods for Tibet. He pays for the commodities 680 rupees (7·7 kg. of silver), mostly various kinds of stuffs (*chapla, alaja, biari khassa*, white *cheera*, thick and thin calico, *solagazi*, etc.).

He departs from Patna on 31st March, passing on his way through the stations of Hajipur, Minapur, Birba and Patrinka. From Birba his ascending trip begins. Hovhannes hires a beast of burden to load the goods (he calls it a 'cow', meaning presumably the yaks that were used in those parts as pack animals).

On 21st April 1686, he arrives in Nepal (he writes it as 'Nekpal') where he stays for three months.

In the meantime Nepal was partitioned into a number of small mutually hostile feudal principalities. The valley of Nepal comprised the kingdoms of Kathmandu (Kantipur), Bhadgaon (Bhaktapur) and Patna (Lalitapur), ruled by the princes of the Malla dynasty.[2]

Hovhannes pays a visit to those three major centres of Nepal. On 19th July he leaves Kathmandu (here, too, he makes some minor purchases) for Tibet. He comes to Bhadgaon (he writes 'Badgam') via Sanko, Listi, Kassai, Kuti, Ziguichai[3] and Lhasa.[4]

The place name of Kuti he mentions (the old name of the pass being Tong-Li) enables us to determine the track our merchant has used. Even to this day the busiest road from Nepal to Tibet lies through this pass of the Himalayas.

His journey to Lhasa takes about two and a half months, from 19th July to 30th September 1686.

Hovhannes, son of the priest David, is the third personality so far known in Oriental studies who had penetrated into Tibet and had made records about this country. The first of these Western travellers was the Franciscan missionary, Odorico of Pordenone, who visited Lhasa in 1325-26 and he left concise yet dubious data on the mode of life and religious beliefs of the Tibetans.[5]

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[1] This list includes also the names of those persons that are mentioned during his second trip to Patna in 1692.

[2] I. Red'ko, Nepal, Taškent, 1958, p. 10 sq.

[3] The settlement transcribed as 'Ziguichai' is Shikadze (known also as Shikhatsze, Sikatse, Jigarji—in Tibetan spelling Bzhi-k'a-rtse, etc.), the next in importance administrative and religious centre of Tibet. It is the seat of the Panchen Lama. *See* the various transcriptions of this place name in the works given below:

I. Ya. Bičurin (Iakinf)—Sobranie svedeniĭ po istoričeskoĭ geografii vostočnoĭ i sredinnoĭ Azii, Čeboksary, 1960, p. 557; I. M. Prževalskiĭ, Iz Zaĭcana čerez Xamsi v Tibet, Moskva, 1948, p. 218; N. V. Kyuner, Opisanie Tibeta, č. I, Vladivostok, 1907, pp. 1-2.

[4] His transcription of the city is Lassa. This is also the way Tibet's capital is pronounced by the Chinese. (*See* I. Ya. Bičurin, *op. cit.*, p. 536.)

[5] Les Voyages en Asie au XIVe siècle du bienheureux frère Odoric de Pordenone, religieux de St. François, ed. H. Cordier, Paris, 1891, pp. 449-54.

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No European visited Tibet ever since, until the year 1661 when the Austrian Jesuit, Johan Gruber, in company with the Frenchman, Albert d'Orville, left Peking for Lhasa (via Sinin and Nang-chou), where they stayed for two months, after which went over to India and came to Agra by way of Nepal. In some of his letters Gruber gives valuable information, especially on the geography of Tibet and the way of life of its people.[1]

The European predecessors of our merchant made very brief stays in the capital of Tibet, and few are the facts that they have recorded, particularly on the economic life of that distant land. On the other hand, Hovhannes Joughayetsi lived there for almost five years (57 months), had dealings with scores of government employees, Buddhist clergymen and merchants, learned Tibetan, sold and bought various goods, paid taxes and duties, tried and was tried; and on all those facts he entered in the ledger precise and reliable data.

Hovhannes is so far the first and only Armenian merchant whose ledger treating of his dealings in Tibet has reached us. However, he has trodden the path of most of his Armenian predecessors visiting this country, well-known to the Armenian Khoja capital. In the text-book compiled for the commercial school in Nor Jougha, Kostand Joughayetsi has also given authentic data on the units of measure and weights used in Tibet (Butand), of course, gathering the facts from those merchants in Nor Jougha who had been to that country long before Hovhannes and were well aware of the local way of life and customs.[2]

And it was on 30th September 1686, that Hovhannes entered Lhasa.

To rely on his own testimony, at the time he knew neither the language nor the customs: 'When I first went to Lhasa I knew neither the local language, nor the customs and measures.'

Yet he did not experience great difficulties; the Armenian merchants residing in Lhasa, and particularly the Tibetan employees of Hovhannes' masters living in Nor Jougha, helped Hovhannes to conduct successfully his business transactions in the new environment.

During his five-year stay in Lhasa our merchant had dealings with many Armenian, Tibetan and Kashmirian merchants and buyers. He mentions the names of most of them: Tsatour son of Ghoukas; Melijan son of Poghos; Abraham son of Gazketsi Karapet; Matos of the Melijans; Nekghos (i.e. Nikoghos); Hakob; Khumtsi Agha; Davoot; Murat; Hovhan son of Sargis; Agntsi Aslan; Petros; Nemo Anjole; *Nivar*[3] Kanashnki, *Nivar* Jekalia, *Nivar* Mado, *Nivar* Garoo; the Kashmirian Hafiz Enahat, the Kashmirian Sadegh, the Kashmirian Khoja Ismahel; Kotval; Shamoo-gone; Tsomgo Lovza; Lamai Kisi; Azish Lamu; Gampai Lamu; Lamu Buine; Hakoo Lamu; Dev Nassu; Devai Chalink Pumule; Haji Mahmud; Molai Hashoot; the goldsmith Devmoo; the smith Assit; the tailor Jansi; the barber Dobu; etc.

Some of the above-mentioned merchants were in Lhasa together with their families. The ledger contains entries as to the death of David's son and as to giving a certain sum to him in this connection as well as of giving some 'money for dress' to Nikoghos' wife (Khizani) on the eve of the Easter.

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[1] M. Thévenot, Relations de divers voyages curieux qui n'ont point été publiées . . .

[2] K. Joughayetsi's *Manual for Trade* contains valuable data: 'And Butand where the accepted measure of weight is the *lank*; 1 *lank* = 10 *miskalis* which is named one *gaturi*; 1 *miskali* is 5 *foons*; 1 *foon* makes 19 *grans*. The Tibetan 10 *miskalis* equal Iranian 8. The Tibetan 1 *miskali* is 77 *grans* in Iran.

[3] *Nivar* or *Nvar* is the name given to one of the races living in Tibet (*see* N. V. Kyuper, Opisanie Tibeta, čast' vtoraya, Etnografičeskaya, Vypusk I–I, Ostay i byt naseleniya, Vladivostok, 1908, p. 4.

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For some time Hovhannes lived in the family of Nikoghos and they shared the expenses on food.

Lhasa has been the remotest haven for our Hovhannes. He made no new trips during his five-year stay there. But most of the Armenian merchants, and in particular Tsatoor, Melijan, Nikoghos and Davoot, had more than once gone to a very distant place from Lhasa, named Slink in the ledger, from where they took great amounts of ingots of gold, tea, musk and shawl of Slink. We found out that Slink in Tibetan (also Sillin, Zilin) was the name given to the city of Sinin (Si-Nin) bordering on China. Two ways led to Sinin from Lhasa, one of them 1,800 and the other 1,700 km. long. To get to Sinin one had to cross hundreds of kilometres of uninhabited and difficult mountain tracks.[1]

In Lhasa Hovhannes begins to sell the goods he takes with him, first to his compatriots, Tsatoor, Melijan, Abraham, and others, the cost of most of them payable within a year. Thus one of the entries reads: 'I sold to Tsatoor seven sets of amber beads weighing 16 *tanks*, the sum to be paid in a year on his return from Slink,' or 'I sold to Poghos, son of Melijan (then he enumerates the different ambers weighing 64 *tanks* in all), the cost price to be sent from Slink in a year', etc. In addition to precious stones, Hovhannes gives to his compatriots silver in place of gold at the rate of seven to one. The same Melijan, for instance, gets from our merchant 504 (19 kg.) of silver 'to be paid in a year's time—one *khamser* gold in return for seven *tanks* of silver, to be sent from Slink, or paid on his return'.

However, it was natural that most of the buyers should be local tradesmen and representatives of the feudal upper layers. Hovhannes was in close contact with the Nivars—Soon Dev, Kanashnki and Jegalia; he sells them more than once amber and other valuable stones to get musk in return.

In Lhasa Hovhannes buys, in the main, musk, tea and gold. On the eve of his departure he fills 18 sacks with musk he had bought in those years and in a special account he enlists all the important entries in the ledger concerning his purchases of musk.[2] Leaving Lhasa he takes with him 483 kg. of musk. The gold he buys weighs 5 kg. 130 g. He also takes other goods with him such as brassware, chinaware, high-priced woven fabric, spices, tobacco, and so on.

On 10th February 1688, Melijan Matos, an employee of Hovhannes' masters, dies in Lhasa; whereupon our merchant becomes the will-maker of his personal effects and goods. Hovhannes opens a new chapter in the ledger where particulars are recorded about his transactions relating to the money and personal effects left by the late Matos.

On 21st June 1692, Hovhannes leaves Lhasa to return to India by the same way. He arrives at Ziguichai on 3rd July, at Kuti on 30th July and at Kassai on 3rd August. Crossing the difficult mountain track lying between the two last places, our reticent merchant does no more contain himself as he notes down the following lines: 'The entire track is obliterated by flood waters; it is the road to hell; you have to cross a hair's bridge.' Then passing through the settlements of List and Sanko, Hovhannes comes to Kathmandu on 18th August where he sells some of the goods and makes purchases (he buys candles, cardamom, *tumafarmin*, 30 batches of paper, a brass-made candlestick, a fishing-net with leaden accessories, various textiles, etc.).

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[1] *See* 'Putešestvie v Tibet', by Sarat Čandra Das, pp. xiv–xv.

[2] Musk (Latin 'muscus') is a very fragrant substance which some untamed male animals and mammals produce. In the Middle Ages this substance was in great demand in the market and was used in perfumery and medicine.

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A caravan was bound to leave Kathmandu on 28th November 1692; Hovhannes was to join it. Yet the current unfavourable political conditions hinder his plans, and he has to stay a few months more in Nepal. In this connection he makes the following entry: 'On the 1st of the month of Hamira, the Raja's caravan that recently set out from Nekpal for Makvanpur was taken prisoner by Nivar Spandiar; they are in a state of war and the road is barred. We shall see what the Holy Spirit has in store for us. Our Lord Jesus keep us aloof from danger, we are poor.'

Hovhannes commissions a person to go to Darbhanga 'to get a permit of leave from the Navab'. A little later he refers to the matter again as he writes: 'At first he was refused the permit on the grounds that the entire country was at war and in case of a mishap, who was to be held responsible? Later, when the Kashmirians returned from Patna, the permit was issued.'

Upon orders from the Navab of Darbhanga, on 13th March 1693, Hovhannes leaves Kathmandu and comes to Badgam (Bhatgaon) a day later. Next he passes through the settlements of Kambu, Sanku and Golkhibas before he arrives at Patrinkai on 21st March, the first town across the Indian frontier. The next stations he calls at are: Kotraihai, Erajvarai, Damami, Batnaiai, Naraingat, Gagrigat, Chanter. Part of the way (from Erajvarai to Batnaiai) was unsafe. Hovhannes and the accompanying Jew merchants hire 12 mounted bodyguards to cross that part in safety.

On 2nd April, Hovhannes gets to Mazaffarpur, then to Hajipur, and on 5th April to Patna. Here he stays again for seven months, calling in the meantime at Hajipur for a couple of days.

In Patna Hovhannes puts up in the room that had been hired for visiting Armenian merchants by a certain master, Petros ('Master Petros has hired a room for visitors to stop at'), and begins his trade. He sells his and the late Matos' gold through the middle-man, Enoop, the candle he had bought from Nepal and other goods. He buys 50·5 litres of *soupon*, 68 litres of *adrak* (so far the names of those goods remain unintelligible to us),[1] 22·5 *sers* of myrobalanum, 14 hookahs, precious stones (emerald, ruby), various costly textiles, and so on. On 30th July he goes to Bihar for a few days where, too, an Armenian colony was in existence with a church of its own.

On 26th October, 1693, having shipped part of the goods he had brought from Lhasa, Hovhannes undertakes a trip along the Ganges, and on 4th November arrives at Rajmahal where he stops for seven days before he continues his trip down the river. On 18th November he comes to Hookley (Hooghly): 'By God's will', writes he, 'we arrived together with our goods at Hookley Bandari, safe and sound.'

He found here some noted Armenian merchants as Marut and Issai, members of the well-known dynasty of the Joughayetsi Lusiks, Hovhannes son of Janoom, Panos son of Hovhannes of Erevan, a certain Vartanes, and Grigor. He also makes mention of the Armenian church in Hookley; he gives the priest of the church some money for the mass.

In 1688, the year when Hovhannes started for Tibet, the English Company in Eastern India signed a contract with a prominent Armenian merchant, Panos Kalantar, a resident of Surat, according to which the latter pledged to give up the overland transit route and to carry the freight from India and Iran to Europe by water using the ships of the Company. Presumably by reason of this agreement, our Hovhannes 'loaded' as he puts '*soupons* for Calcutta to be given to the English', on 2nd December. Two

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[1] *Adrak* = ginger; *soupon* = Hindi *saũph* < *saumph* (from Sanskrit *śata-puṣpā* > Prakrit *sāvuppha, saaũmpha*) = anise [S. K. Chatterji].

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days later he arrives in Calcutta on board a ship[1] and sells to the Englishmen 12 litres (25 *sers*, 241 kg.) of his *soupons* at 213 rupees.

On 6th December 1693, Hovhannes returns to Calcutta from Hookley and it is at this place that his invaluable ledger ends.

## III

In following the routes of the Armenian merchant, Hovhannes Joughayetsi, in the years 1682–93, we attempted at the same time to show what he and the other merchants in touch with him imported to India, Nepal and Tibet and what they exported from those countries. This point, however, deserves particular attention; for, apart from the main commodities entered, the ledger contains also the names of hundreds of other items and data as to where they had been acquired and which were the more profitable markets.

A study of this series of problems involves a great many difficulties since Hovhannes enumerates on the whole the goods subject to selling and purchasing in terms of names widespread among the merchants of Jougha in those days, yet quite unknown to us today. Thus he speaks, for instance, of goods produced in *Kherapat* or *Lakayur*, i.e. the cities of Khairabad and Laharpur. One can gather from the ledger that those are, no doubt, fabrics, yet the stuffs of which they were made (wool, cotton, flax, silk or some other material), their standards and patterns are questions that remain so far unanswered.

The data contained in the ledger, that relate to the business transactions of Hovhannes, will naturally draw the attention of those specialists who are engaged in the study of the history of craftsmanship and trade in India, Nepal and Tibet. To facilitate, to some extent, their work, we quote in an alphabetical order the names of almost all the goods enlisted in the ledger, furnishing them, as far as possible, with concise explanations. (The list has been drawn up with the active participation of H. Papazian):

1. *Adoar*—the name of a cloth; bought in all two lengths in Kairabad; paid 1,252 rupees.
2. *Aghegh*—a precious stone-sard; two types are mentioned—white and limpet.
3. *Alaja*—(various sorts of *alaja* are mentioned: *chukha*, *timgayi*, *kham*, *charkhana*), a variegated cloth, coverlet.
4. *Aloor*—flour.
5. *Ambravi kezez*—the stone of date-palm of which beads were made.
6. *Ampua*—a kind of dress made of *chanti*.
7. *Anach*—uncertain.
8. *Apricshoom*—a silk thread of which hoods were made.
9. *Ater* (also green *ater*)—an aromatic leaf used as spice.
10. *Atrak*, *atrak jam*—a square towel, handkerchief.
11. *Bafta*—a cotton fabric.
12. *Bampak*—cotton.
13. *Bank parai*—uncertain.
14. *Banovsha*—a violet dye.
15. *Bara gaza*—the name of a cotton cloth manufactured in Lakahur and elsewhere; he bought it at the price of 2·5 rupees per length.

[1] Ashot Hovhannissian, *Episodes from the History of the Free-burning Mind of the Armenians*, 2nd book, Yerevan, 1959, p. 450 (in Armenian).

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16. *Bardar*—coarse fabric ostensibly used for wrapping the bales.
17. *Baroot*—gunpowder.
18. *Behdana*—quince stone used in medicine.
19. *Bihari khassa*—a costly cloth; he bought the length at 1·75 rupees.
20. *Boghcha*—a simple cloth; bought for making clothes for the servants.
21. *Boore* (which is *kechifarta*)—uncertain; he bought one only.
22. *Boorghi*—a precious stone.
23. *Boozghanch*—uncertain.
24. *Bora*—a sack.
25. *Brindz*—rice.
26. *Chadir*—a tent.
27. *Chai*—tea.
28. *Chakma*—footwear.
29. *Chali* (which is *jajim*)—a small carpet.
30. *Chanakh*—a vessel with deep-lying bottom.
31. *Chanti* (*kura*, thin and white)—a kind of cloth; he bought it in Sironj.
32. *Chapla*—expensive cloth bought in Patna; the length at about 3 rupees.
33. *Cherak*—an icon-lamp.
34. *Chini* (bowls, cups, etc.)—chinaware.
35. *Chipigari*—uncertain.
36. *Chrra* (white, thick, thin badla)—gold-thread-woven fabric.
37. *Chit* (of *Valanduz*, *Bandar*, *Bnaris*, *Unugur*, thick, thin, *Siakat*)—calico.
38. *Chola*—cloth, 1·08 rupee the length.
39. *Chot*—cloth.
40. *Chotabara*—cloth, 0·64 rupee the length.
41. *Chotari*—cloth, 0·25 rupee the length.
42. *Chovia*—lining.
43. *Chuni*—a kind of article sold by the piece.
44. *Daba*—a leather pouch.
45. *Danak*—a knife.
46. *Dastakhan dogazi*—a tablecloth, two gazes long.
47. *Dergazi*—a cloth, he bought in Khairabad, 333 lengths and sent it to Isfahan and Istanbul for sale.
48. *Durbin inglisi*—an English spyglass.
49. *Duria, durie*—a costly cloth; he sold the length at 5·5 rupees.
50. *Dzet*—thread (?).
51. *Emerti*—a kind of fabric; he bought three lengths for 6·525 rupees (including the price for dying).
52. *Erankin*—the same washed-white gaz.
53. *Erekhta*—ingot of gold.
54. *Erevant*—rhubarb.
55. *Fili lain*—ivory (?).
56. *Foota*—gold-thread-woven fabric.
57. *Gani*—a coarse thick fabric to make 'bora'.
58. *Gavat*—a cup.
59. *Ghalam franki*—a European pen.[1]
60. *Ghalian*—a hookah.

1. Following the pronunciation of غ as gh in Persian, we have *Gh* for غ in this and some other words [S. K. Chatterji].

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61. *Ghotazi poch*—the tail of an ox-like animal that was fastened to the ends of flags.
62. *Ghufl*—a padlock.
63. *Ghuti*—a box.
64. *Glula*—a bullet.
65. *Gon*—leather.
66. *Grdloo*—a precious stone.
67. *Gulap*—rose-water.
68. *Halila*—a kind of plant (myrobalam). [Skt. *haritakī*: S. K. C.]
69. *Jajim*—a thick tarpaulin-like cloth.
70. *Jezma*—slippers.
71. *Jola*—see *chola*.
72. *Jora*—perhaps *jorap*, i.e. stockings.
73. *Kadak*—handkerchief or coverlet-shaped white or green silk cloth. Widespread in Tibet as articles for sacrifice.
74. *Kaghat*—paper.
75. *Kaghtsreghen*—sweetmeats.
76. *Kalaiptun—klapiton*, i.e. an edge laced with gold and silver threads.
77. *Kandi*—an expensive cloth, 2 rupees the length.
78. *Karbar*—amber.
79. *Karmizar*—piece-goods, each bought for 3·5 rupees.
80. *Kassa* (brass or iron-made)—a vessel with deep-lying bottom.
81. *Kesh* (green, *lahuri*, *charkhana*)—probably a coverlet.
82. *Kesherk*—scales.
83. *Keshta*—a fabric used for covering the goods or the sacks.
84. *Khanchal*—a dagger.
85. *Khassa bihari—see* Bihari *khassa*.
86. *Khavandasta*—mortar and pestle.
87. *Khazan arkaté*—an iron saucepan.
88. *Kherapati*—a costly fabric manufactured in the same city.
89. *Koochin*—a cloth of large dimensions which he bought in Lhasa.
90. *Koorajani*—uncertain.
91. *Koora ketav*—used as coverlet for loads.
92. *Kor*—a kind of article sold by the piece.
93. *Kotoo*—coarse cotton.
94. *Ktav*—a white, thick sama-cloth.
95. *Makhmoor zarov*—velvet woven in gold-thread.
96. *Mamoorkhani*—an expensive cloth; he bought the length at 1·1 rupee.
97. *Mancha*—goods sold by weight; he bought this kind in Lhasa.
98. *Lachidana*—cardamom.
99. *Lafaf*—a coverlet.
100. *Lagan*—a large vessel for water.
101. *Lajvart*—a costly dye, sea-blue, of mineral composition.
102. *Lain*—an inexpensive coloured cloth, perhaps calico.
103. *Lakayuri*—an expensive fabric woven in the same city; he bought the length at 2·5 rupees.
104. *Lanka arkaté*—an iron vessel.
105. *Latoor*—an article sold by the piece; he bought it together with a lock.
106. *Lekhep*—a quilt (< Persian *lihāf*).
107. *Leghak*—blue.
108. *Londriné*—English broadcloth.

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109. *Londré*—inexpensive red stuff.
110. *Mafrash kashé*—a leather-made large-sized sack.
111. *Margarit*—pearl.
112. *Marhama*—a soft cotton cloth that has been used both as towel and for bandaging.
113. *Marmar*—an expensive fabric, 4 rupees the length.
114. *Mekh arkaté*—an iron nail.
115. *Marjam*—a small pearl.
116. *Mintali*—an article sold by weight, probably almond.
117. *Mom*—candle.
118. *Mooshk*—musk.
119. *Mooshtak*—fur, fur-coat.
120. *Mooza*—high-necked shoes.
121. *Necha*—goods sold by the piece; bought in Patna.
122. *Palankpoosh* (thick *mltana*, etc.)—a coarse fabric for wrapping the loads.
123. *Papooch*—simple footwear.
124. *Patari*—a carafe.
125. *Patka*—an inexpensive cloth.
126. *Patka zarov*—gold-thread-woven cloth of large dimensions; he bought it in Benares 15 rupees the length.
127. *Patleghen*—plates and dishes.
128. *Patu* (*tiki*, *pruru*, red, white, etc.)—coarse fabric for clothing.
129. *Peri* (printed)—perhaps a coverlet or a cloak.
130. *Pisooz deghnapeghentsé*—brass candlestick.
131. *Poch*—see *ghotazi poch*.
132. *Samsa* (*sia samsa*)—a cloth adorned with silk.
133. *Sandoogh*—a trunk, box.
134. *Sank*—see *booghzi*.
135. *Sefra*—tablecloth.
136. *Segari* (also *soogari*)—an article sold by weight, bought in Patna, sold in Nepal.
137. *Semagh*—a kind of Oriental spice used in meat courses.
138. *Shakar*—sugar.
139. *Shal*—shawl.
140. *Shila* (red hemp)—a kind of hemp.
141. *Shisha*—a flask or tube.
142. *Solagazi*—a simple cloth for suits and lining.
143. *Soupon*—an article sold by weight; he bought 50 litres of it in Patna and sold the article to the English ( = Hindi *saũph*, 'anise'; *see* footnote No. 1 at p. 10).
144. *Soorai* (perhaps *jastesooriai*)—uncertain.
145. *Soossy* (*soossidaria*)—an expensive silk-woven cloth; he sold it in Agra 2 rupees the length.
146. *Soozani*—laced cloth.
147. *Taghik namazi*—a small carpet to pray on.
148. *Taisamsa*—an article sold in pairs.
149. *Tali*—a kind of piece-goods.
150. *Talis*—hemp-thread-woven cloth.
151. *Tambaku*—a kind of tobacco.
152. *Tamk dziu*—horse saddle.
153. *Tantsoo*—a kind of precious stone.
154. *Tas*—a plate.
155. *Tas chaikhori*—a tea plate, saucer.
156. *Tavartash*—some kind of piece-goods.

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157. *Tavizani*—an ornament made of precious stones, beads.
158. *Tefeldan beghendze*—spittoon.
159. *Tel*—thread.
160. *Timach karmir*—inexpensive cloth; bought in Nepal, the length at 14·25 rupees.
161. *Tirma* (red, white *tiki tirma*)—a fabric made of fine goat hair.
162. *Tla-i zar*—gold thread.
163. *Toomafarmis*—some kind of goods sold loose.
164. *Torn*—fishing-net.
165. *Utu*—an iron.
166. *Varpoosh* (of Tabriz, Agra, etc.)—a simple cloth used as coverlet; a sack.
167. *Yapnji*—felt used to wrap the bales.
168. *Yara gazi*—the same as thin *chanti*.
169. *Yil jankali*—cardamom.
170. *Yudi*—a dress made of chanti.
171. *Zafran*—saffron.
172. *Zarajat*—small articles.
173. *Zemroot*—emerald.
174. *Zoof*—a woollen fabric.[1]

This list indicates that in addition to the basic items of import and export (expensive fabrics, precious stones, musk, spices, tea, chinaware, etc.) Hovhannes, son of the priest David, and the other merchants from Jougha also bought and sold articles of lesser consequence in compliance with the requirements of the population of India, Nepal and Tibet and particularly the upper layers of the feudal class. Likewise they took a hand in the domestic trade of those countries.

## IV

The scientific value of the ledger assumes greater significance if we realize the fact that its author has given in detail reliable figures as to the volume, weight and price of all the goods. Many are, too, the data relating to the prices of the goods sold, with the exception of those that were despatched to Isfahan, Brusa and elsewhere or were sold after 1693 (the entries in the ledger end in that year).

The task confronting the economists and historians is the evaluation and professional analysis of the data Hovhannes has put forward. As this lies beyond the scope of the present paper, we should like, nevertheless, to draw attention to some of the entries that have to do with the retail market prices of foodstuffs in India; this will promote the study of the living standards of India and her neighbours in those days.

On 8th September 1693, Hovhannes buys in Patna 13 litres 11 *sers* of rice paying 17 rupees. The measure unit of India called *akpar* litre is the equivalent of 25 kg. 509 g.; *ser*—the fortieth part of one litre—is equal to 637 g. Therefore our merchant buys about 400 kg. of rice at 17 rupees the kilo which means the weight of 194·4 grams of silver. Thus he pays 0·48 grams of silver for a kilogram of rice. There is another fact about the purchase of rice which reveals that he has paid 0·58 grams of silver per kilo. In the same year and place he buys '14 *sers* of flour' paying 0·55 rupees, i.e. 6·23 grams of silver. Fourteen *sers* equal almost nine kilograms, therefore one kilogram of flour he buys at 0·69 grams of silver.

[1] The list does not include a number of goods so far undeciphered or unchecked.

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On his way back from Tibet to India he buys 3 sheep, paying 2·5 rupees which means that each sheep came to 9·65 grams of silver.

It should be useful to give a rough estimate of the money or silver our merchant used to spend on food daily. This fact is also treated of by noteworthy records. Almost two-and-a-half years past his arrival in India he states: 'On the 28th of the month we gave for food 6·5 *lanks* per month which makes in all 182 *lanks*.' Thus his daily expenses amount to 8·18 grams of silver or 0·72 rupee.

Those entries in the ledger that pertain to the sum he has spent on food during his five-year stay in Tibet are of great interest: 'In 76 (Azaria Style), on the 21st of the month of Shbat (i.e. on 21st June, 1692), Tuesday, we set out from Lassua. During the 57 months my expenses on food came to 171 *lanks* 5·5 *miskalis* including food and pocket-money. I made up one account for all of those expenses.'

Accordingly he spends during the 57 months 171 *lanks* 5·5 *miskalis* in all that is 6 kg. 482 grams of silver which means a daily average of 3·79 grams of silver. One can deduce from these data that as compared to India foodstuffs were cheaper in Tibet.

Diverse and valuable are the evidences concerning the profits derived from the sale of various items to be found in the ledger. We are already aware of the fact that the 16 *charms* (about 368 kg.) of indigo our merchant bought in Khurja in the year 1684 were sent to his friend, Hovhan of Shiraz, for sale in Basra. According to one entry 'the expenses on 16 *charms* of indigo including those for shipping came to 3,842·33 rupees' or 139 *tumans* 3,200 *dians*.[1] Hovhan of Shiraz fulfilled the commission and in a letter, excerpts from which are quoted in the ledger, he says: 'I have sold 16 *charms* of indigo in Basra, have received ready money 208 *tumans* 7,385 *dians*.'

Thus Hovhannes had from the sale of indigo a net profit of 69 *tumans* 4,185 *dians* which forms almost 50 per cent of the cost price.

On 15th January 1686, Hovhannes buys 23 lengths of *palankpoosh* in Agra at 29·78 rupees. He sells the same goods in Kathmandu for 50·5 rupees. The net profit amounts to 20·72 rupees or about 71 per cent.

He buys in Agra 60 lengths of *unuguri* calico paying 56·275 rupees. Seven lengths he gives to various persons as present, 53 he sells in Nepal for 92·28 rupees (1·73 rupees per length). If he sold at the same price the lengths he had made presents of, he would gain extra 13·12 rupees. Thus his net profit comes to 49·2 rupees or about 88 per cent.

On 25th February of the same year he buys 20 lengths of *palankpoosh* and 2 lengths of *soozany* in Shahzadpur paying 14·55 rupees. He sells these goods in Lhasa for 29·27 rupees. The net profits amount to 14·72 rupees or above 100 per cent.

In Patna he buys some small articles for 7·3 rupees, which he sells in Lhasa for 17 rupees. The net profit is 9·7 rupees or 132 per cent. He purchases in the same city half a litre of Chinese sugar[2] for 6·75 rupees. Half of it, as he says, 'has been consumed' (that is he uses himself) selling the other half in Nepal for 8 rupees.

The whole he could sell for 16 rupees which would mean a profit of 9·25 rupees or 137 per cent.

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[1] Hovhannes notes on many occasions that 1 *tuman* is the equivalent of 27 *shahijani* rupees.

[2] It is interesting to note that the commonest word for *sugar* in Bengal and Eastern India is *chini* or 'the Chinese article', and not the native Indian word, *sakkar* (= Sanskrit *śarkarā*): this is due to the Chinese method of bleaching brown sugar into white, which appears to have come to India possibly before A.D. 1500 [S. K. Chatterji].

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Many more similar interesting evidences can be cited. Unfortunately, however, the ledger lacks such data as would allow us to see the profits Hovhannes had acquired from the sale of basic items: precious stones, musk, tea and spices. The precious stones that he took to Tibet (amber, pearl, cardamom, and so forth) he exchanged for musk and tea; and the facts that relate to the sale of the goods brought from Tibet must have been entered at a later date in the unpreserved pages of the ledger.

Nevertheless the data available provide enough evidence to conclude that penetrating into the remote corners of India and particularly in Nepal, Tibet and China, the Armenian merchants used to derive net profits of from 70 to 130 per cent from their transactions.

## V

The ledger of Hovhannes, son of the priest David, is an inestimable source whereby one can get a true knowledge of the duties imposed on commercial goods in Iran, India, Nepal and Tibet, the size and kind of other taxes, the ways in which goods and money were taken from one place to another, the terms of money loans and the investigation of related questions.

Let us now dwell in brief on this set of questions.

Starting off from Nor Jougha Hovhannes takes with him to India only 18 pieces of broadcloth. On Iranian soil, before he reaches Bandar-Abbas, he pays tax in four places *erakhtarana* (i.e. a tax imposed in favour of those guarding the roads). In Mahear he gives 520 *dians*, in Yezdkhas 50, in Shiraz 1 *tuman* 2,100 *dians* for weighing the goods, Zaghat 1,000 *dians*, *erakhtarana*—1 *tuman* 2,480 *dians* (in all 2 *tumans* 5,580 *dians*), in Lar 100 *dians* as *erakhtarana*.

Kostand Joughayetsi reports in his *Manual for Trade* particulars on the fixed taxes levied by government officials at Bandar-Abbas when taking goods out of Iran: 'At Bandar-Abbas and Kank', writes he, 'the customs *dalal* (official) exacts duties 1,000 *dians* per *tuman*, 350 *dians* is the *khoorooj*, 122 is the *roossoom*, 50 *dians*—nevissandi;[1] thus the tax levied per *tuman* comes to 1,522 *dians*.'

The data entered by our merchant fail to concur at certain places with those of the *Manual for Trade* which points to the violation of existing tariffs by the tax-collectors for their private ends. According to data of the ledger the middle-man measures in Bandar-Abbas and counts 18 pieces of broadcloth; he finds 36 *gazes* in every piece and every *gaz* estimating at 2,500 *dians*, the middle-man evaluates the goods of Hovhannes at 148 *tumans* 5,000 *dians*; and they exact the taxes accordingly:

(1) *Oushour*.—Out of every *tuman* they have exacted 1,077·5 *dians*, or 10·775 per cent of the whole (according to the *Manual for Trade* they ought to have exacted 10 per cent). Hovhannes has paid 16 *tumans* for *oushour*.

(2) *Khoorooch* ('out'—the tax levied for exporting the goods from the country).—They exact 360 *dians* out of every *tuman* (3·6 per cent) while according to the *Manual for Trade* 3·5 per cent is the appointed tax. He pays 5 *tumans* 3,420 *dians* for *khoorooch*.

(3) *Eresoom* ('taxes').—They have exacted 1,220 *dians* for every *tuman*, adding *oushour* and *khoorooj*. This kind of tax has amounted to 2 *tumans* 5,620 *dians*.

[1] *See* the list of local taxes.



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(4) *Ghavz darougḥaki* (a tax paid to get a receipt from *darougha*).— They have levied 100 *dians* for every bale of goods, that has come in all to 600 *dians* (this is not mentioned in the *Manual for Trade*).

(5) Hovhannes gives 600 *dians* to the *Shahandar*, the chief of the port, and to *Nvisandi*, the Clerk (according to the *Manual for Trade* 50 *dians* were to be given to the clerk alone).

Thus for goods that were valued at 148·5 *tumans* the various taxes to be levied at Bandar-Abbas should be, according to Kostand Joughayetsi, 22 *tumans* 6,017 *dians* while in fact they have exacted 24 *tumans* 240 *dians*, i.e. 16 per cent of the total value of the exported goods.

As to the cost price of the commodities bought in India, frequently Hovhannes adds in his ledger also the sum of the taxes paid, which makes it difficult to determine the price and the tax of the goods. There are, however, exceptions to this which enables one to get some knowledge of the taxes imposed in India on marketable goods.

Kostand Joughayetsi has the following entry in his *Manual for Trade* concerning the taxes, exacted in Surat for precious stones: 'For amber and other precious stones the duty imposed is 38·5 per one thousand.'[1]

The ledger clears up this matter, too.

On 28th November 1686, while preparing to set out for Tibet, he agrees to take with him a large amount of amber. He writes in this connection: 'On the 1st of the month Hamira in Ekra, in the presence of the representatives of the Armenian commercial community I got 365 *sers* of amber from Mr. Avetik. Those representatives took away 5 *sers* as tare; they appreciated the remaining 360 *sers* at 16 rupees per *ser*. The ambers were valued at 1,760 rupees altogether. In Ekra 4·8 per cent went to the customs-house for precious stones, in all 33 rupees.'

As it can be seen, 4·8 per cent was the *oushour*[2] levied for the amber and not 38·5 per thousand, as pointed out by Kostand Joughayetsi.

Hovhannes makes no mention of the customs-houses lying on the route from Agra to Patna; he states only the sum total of the duties imposed on his goods: 'From Ekra to Patna together with the Kashmirians and Benares to Patna I alone paid 42 rupees for duty.'

But beginning from Patna he enumerates the taxes exacted from him in the following way: 'The sum total of the precious stones was 8,000 rupees. In Patna the customs-house for precious stones imposed a duty of 0·3 per cent—in all 30 rupees.' Apart from this he has given to the clerk 1 rupee and to the supervisors 3 rupees of tax.

Hovhannes must have hidden his jewels in the customs-house of Danti (he acts similarly in Hajipur, confessing in his ledger: 'I have paid no tax for the amber.' Duty was imposed on him for other commodities. 'At the customs-house in Danti I paid 7 rupees duty for the indigo, calico and other items I had bought in Patna.'

In the settlement of Gnkinpur he has given *hassil*, *nvisandi*, *nafurana* and *zaghat*, totalling 4·05 rupees. These, no doubt, have been small customs-offices. The main customs-house on the border of Nepal and India was, in all probability, to be found in Hajipur. Here Hovhannes pays 16·25 rupees of tax for the goods he takes across the frontier (excluding the precious stones). In this connection he writes in the ledger: 'At the customs-house in Hajipur I gave 16·25 rupees of tax for the 12 *bakoos* of indigo, the calico which I had bought in Ekra and the *kessoor* of Patna.'

[1] The Mashtots Matenadaran, MS. No. 5994, p. 14*a*.
[2] The terms, *oushour* and *zaghat*, are synonymous.



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More particulars are to be found in the ledger referring to the types and range of taxes and duties exacted; those details were entered after his return from Tibet to Patna. In Patna at the Sultan or Central customs-house the goods brought by Hovhannes from Lhasa are valued at 22,198 rupees (more than 250 kg. of silver) and taxes are imposed on every article. They read as follows:

1. *Hassil*—(*a*) for the grass (tea ?) brought, 3·5 per cent tax, amounting to 745·3 rupees in all; (*b*) for *saghadbari*, 1·25 per cent tax; 31·5 rupees in all.
2. *Mootassad duty*—12 rupees.
3. *Tafildar*—3·35 rupees.
4. *Moushrouf*—15·5 rupees.
5. *Eminana*—15·5 rupees.
6. *Daroogh*—11 rupees.
7. *Dakhil khazana*—0·55 per cent tax; in all 4·56 rupees.
8. *Nvissanda*—6·75 rupees.
9. *Dalal*—44 rupees.

Thus the 22,198 rupees worth of goods imported to India (250 kg. of silver) have cost Hovhannes 889·46 rupees (10 kg. of silver) of tax, i.e. four per cent of the cost price of the goods.

The data relating to the taxes imposed in Nepal and Tibet, as entered in the ledger, are likewise worthy of mention.

The taxes exacted by the Raja in Kathmandu total 167·3 rupees, including the basic tax, called *benti erok*, for which Hovhannes pays 200 small *mellis*, i.e. 100 rupees in ready money. In addition, as our merchant states: 'I had an English spyglass; the Raja took it and valued at 50 small *mellis*.'

Moreover, apart from the taxes, Hovhannes gives tips to the Raja in Kathmandu, the three *bansars* and the *erna*; the Raja of Badgam, the *pardan* and the two *bansars* into the bargain. He tips them also with various kinds of fabrics (mostly inexpensive), sweetmeats, etc. He gives one length of calico to the official of the local customs-house for measuring the stuffs and some money for taking the goods to the chief for sealing. He makes a present of 2 rupees to the *pardan* of list and gives 2 rupees to the *dev* of Kuti before he gets to Lhasa.

On the third day of Hovhannes' arrival in Lhasa (3rd October 1686), his goods get cleared by the customs-officers of an establishment called Lovran. They tax him the worth of 930 *lanks* (34 kg. 144 g.) of silver in the form of precious stones and other goods for *sarkare*—a sort of tax; they inform him that of this sum 182 *lanks* or the equivalent of 6 kg. 877·7 g. of silver will not be returned while the rest, i.e. 748 *lanks*, will be reimbursed in future (they give him a promissory note to this effect).

On 19th December of the same year Hovhannes in fact gets back those 748 *lanks* (27 kg. 266 g.) of silver. Yet the metal turns out to be debased. After melting and purifying, he incurs a loss of 121 *lanks* of silver. Thus our merchant pays to the government officials in Lhasa for his goods 303 (182+121) *lanks* or 11 kg. 450 g. of silver.

To make the picture of taxes imposed in Lhasa complete we should like to quote the data on the tax named *sokhani*. On various occasions Hovhannes reports that every time one trades a litre of musk, the buyer has to pay one *lank* (37·79 g.) of silver to the state treasury.

The records on duties exacted from tradesmen for imported or exported goods are supplemented by diverse data on other kinds of taxes.

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It is known that Aurangzeb (1659–1707) under whose reign our merchant undertakes his travels to India, *jizian*—the poll-tax—was renewed within the Empire in the year 1679 for the non-Mohammedans.

The ledger contains likewise a number of entries testifying to the payment of *jizian*.

On the very first day of his arrival in Surat, Hovhannes, as he puts, 'bought a certificate confirming my paying the poll-tax'.

This record is inadequate in determining the size of the *jizian*, as Hovhannes does not pay the tax but procures a false document confirming his payment which naturally costs him below the charge. In accordance with two entries testifying to the factual cost of *jizian*, this tax has been 3·5 rupees, but in 1688 Hovhannes already pays for himself and for his servant, Poghos, in Patna 9 rupees which means 4·5 rupees of poll-tax *per capita*. There is one more fact concerning the poll-tax levied in Iran (*sarhana*): 'On going ashore I paid my poll-tax that amounted to 5,300 *dians*, the equivalent of 14·3 rupees.' According to Hovhannes one rupee was the equivalent of 370 *dians*, therefore 5,300 *dians* came to 14·3 rupees. It can be inferred from this entry that poll-tax in Iran was three times as much as in India.

To refer to the tax terms one by one is both impossible and pointless. Yet we think it is useful to quote below the alphabetical list of all the tax and duty terms:

1. *Alidandi*
2. *Anachi kreh*
3. *Barkani*
4. *Benti*
5. *Benti naghtini*
6. *Benti erok*
7. *Bolavi*
8. *Chaputri kharch*
9. *Chookayu kreh*
10. *Chokidari*
11. *Dakhili kharch*
12. *Darasoo*
13. *Darooghaki*
14. *Darvani*
15. *Eminana*
16. *Erachmalin kharch*
17. *Erakhtarana*
18. *Erahtari*
19. *Eravani kharch*
20. *Eressoom*
21. *Erevanti*
22. *Hassil*
23. *Inam*
24. *Jezia*
25. *Khani*
26. *Khoorooch*
27. *Kotivarchi*
28. *Manspadarin kharch*
29. *Massali guin*
30. *Mootasadoo kharch*
31. *Namaloomi*
32. *Nazr*
33. *Novl*
34. *Nvisandi*
35. *Odi kreh* or *Kreodvayu*
36. *Oushour*
37. *Parvankoo*
38. *Psoni*
39. *Salaki*
40. *Sandeghin kreh*
41. *Sarkari zabiti*
42. *Sarhana*
43. *Shabandari*
44. *Slamati*
45. *Smbuki*
46. *Sokuni*
47. *Tandzilé*
48. *Tefildari*
49. *Zaghat*
50. *Zooloomana*

## VI

In order to transport goods from any major administrative centre of state subordination or from any feudal domain or in order to unpack marketable goods, it was essential to have the permission of a government-authorized official or of the local feudal lord which was, of course, issued after levying the proper taxes and climaxed in a special seal that legalized the act.

On his way to Tibet Hovhannes had to wait in Kuti for 10 days for the return of the local ruler (the *dev*) to his residence to seal the bales of our merchant. This is what he says in this connection: 'We stayed in Kuti for 10 days because the *dev* was not in town to seal the goods; then he came and sealed the goods.'

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On his return from Tibet, as Hovhannes attests, in Patna 'they locked the goods in a room as the *Daroughan* had gone to Massi. No one has the right to unlock the door until he comes back'.

The state bodies used to put the privilege of selling certain kinds of goods out to contract to private merchants. In Patna, for instance, candle could be sold only at the price fixed by the contractor of that article. This is what Hovhannes writes on this occasion: 'The sale of candle here is patented by a shopkeeper and candle is sold in accordance with the price he fixes.'

During his business transactions that were of long standing, Hovhannes has had dealings with scores of rulers pertaining to the feudal class of the relevant country as well as with various government officials of high and low ranks. He makes no mention of the names of those persons but speaks of them in terms of the position or title they held. If we bring together such entries of the ledger we shall have the following list of titles, ranks and names pointing to the positions held by people engaged in employments related to trade:

1. *Baldi*
2. *Bansari*
3. *Bari*
4. *Bolava*
5. *Charvadar*
6. *Chokidar*
7. *Chotersi*
8. *Dalal*
9. *Danti*
10. *Darougha*
11. *Dev, Deva*
12. *Doonila*
13. *Doosat*
14. *Emin*
15. *Eraja (Raja)*
16. *Erna*
17. *Goomashta*
18. *Kansi*
19. *Kotval*
20. *Khan*
21. *Lama, Lifun*
22. *Mansabdar*
23. *Mooshroof*
24. *Mooki*
25. *Mootasadi*
26. *Navab*
27. *Nazir*
28. *Nemo*
29. *Nirb*
30. *Nsep*
31. *Nvicanda*
32. *Pardan*
33. *Sardar*
34. *Sarhadar*
35. *Shabandar*
36. *Tefildar*
37. *Valapdas*
38. *Zaghatvali*
39. *Zhoon*

## VII

The specialists of Indian history are at one in their views of the systems of bills and commercial loans being widespread in the mediaeval period of that country, particularly under Akbar (1556–1605). The remittance of large sums of money through bills from one place to another and other bank operations were effected with such skill that they provoked the wonder of European merchants visiting India.[1] Reading the numerous facts in Joughayetsi's ledger of the remittance of money, interest loans and other business transactions, we can observe the same picture during the reign of Aurangzeb.

Hovhannes and the other Armenian tradesmen connected with him took very little ready money during their travels, the basic capital being put into circulation, and when the need for transfer of money from one place to another rose they made use of the bill of exchange, current in the East.

Let us get familiar with some of the entries made in the book to this effect:

1. 'On the 8th of the month of Nadar, Mr. Avetik transferred my 1,000 rupees to Kherabad paying 1 per cent remittance charge; in all 10 rupees.'

[1] K. A. Antonova, Očerki obščestvennyx otnošeniĭ političeskogo stroya mongol'skoĭ Indii, vremen Akbara (1556–1605), Moskva, 1962, p. 121; N. K. Sinha, A. Č. Banerdži, Istoriya Indii, Moskva, 1954, p. 250.

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On the eve of his departure to Tibet, he transfers from Agra to Patna 1,000 rupees to a shroff and writes in this connection:

2. 'I have transferred 1,000 rupees from Ekra to Patna; this is also evidenced by Mr. Avetik's accounts. Remittance charge was 1·275 per cent; in all 13·5 rupees.'

3. 'On the 14th of the month of Ghamar, Hovhan of Shiraz made from Surat a transfer of 1,000 rupees in my name to Mr. Avetik for a period of 41 days. The remittance charge was 4·5 per cent, i.e. 45 rupees in all.'

4. 'On the 3rd of the month of Ayram in Ekra, through the middle-man of Birju, I made a transfer to Surat (in Nazaret's name) of 3,250 rupees. I paid remittance charge of 8 per cent of the transferred sum which came, in all, to 260 rupees.'

It becomes evident from other entries as well that remittance of money (*yendvi*) was effected through shroffs, middle-men, also through people pertaining to the upper layer of the feudal class (for instance, through Murat Khan of Kairabad). Those engaged in money transfers had their representatives in various cities. Thus, for example, Hovhannes has received 50 rupees on account of the money transferred to Patna, from the Benares office of the establishment that had effected the transactions. There was no fixed charge for money transfers; it was arranged by mutual agreement taking into account the distance of the place where the money was to be remitted, the safety of the way, the amount of the money and other circumstances. The remittance charge in the first of the foregoing entries constituted one per cent of the sum total, while in the second 1·275 per cent, in the third 4·5 per cent and in the fourth 8 per cent.

In money transactions carried out through bills, three men used to take part: the remitter, the remittee and the payer. As attested by the ledger, many more complicated money transactions were in operation in India in which more men participated. An instance of similar transaction is afforded, for example, by the fourth entry we have quoted according to which the 3,250 rupees transferred by Hovhannes from Agra to Surat is first remitted to the middle-man of Birju who in turn writes a *yendvi* to Nazaret in Surat thanks to which the latter becomes entitled to the sum in Surat from the '*kota* of Valabdas'.

There is another entry to this effect of greater consequence:

> 'On the 1st of September 1683, I wrote to Mr. Avetik in Agra to transfer 1,000 rupees from my sum to Kairabad to buy *dergazi* for me and let me know so that I should pay the sum here in Srinj. In this connection Mr. Avetik has written that he had sent those 1,000 rupees to Kairabad, and that I should pay the sum to Aghazar to make purchases for me.'

Accordingly Hovhannes gives Aghazar in Sironj 1,000 rupees. Mr. Avetik, who was at the time in Agra, remits on behalf of Hovhannes the same sum to Kairabad so that another man should get the sum there and buy for him the fabric called *dergazi*. Thus, at least five persons participate in the transaction—Hovhannes, Aghazar, Mr. Avetik, the transferor of money from Agra to Kairabad and the receiver of the money in Kairabad.

The ledger also discloses many facts on the use of the simple bill of exchange. During his stay in India (1683–86) Hovhannes borrows interest-bearing money from different persons and on three occasions he lends money himself. A study of the numerous entries relating to this topic shows that the simple bill of exchange provided for 0·75 per cent interest a month of the sum lent.

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This low rate is presumably to be accounted for by the fact that both giver and receiver of money were mutually connected with various transactions and must have had economic expectations from each other. It should be realized that in entering upon such transaction they resided in the same country, often in the same city, therefore the money giver did not entertain any fear as to the sum being remitted in time and in full.

It should be pointed out that the Armenian merchants trusted each other and the local merchants, the middle-men and the shroffs, and helped each other as much as they could. The following fact is noteworthy: On 13th October 1684, in the city of Amdanagor our merchant gives 1,800 rupees to Baba, son of Panos, at 0·75 per cent interest a month, provided he should get the sum back in Agra in 41 days. In effecting this transaction Baba gives no bill to Hovhannes: 'You go now and I'll send the bill to Aurankapat.' And, in fact, as Hovhannes remarks, 'when I came to Aurankapat the receipt was there'. It is also interesting to note that on 27th November 1692, Hovhannes willingly pays to Manvel his debt of 200 rupees though the latter had lost the receipt.

The terms of the loan changed and the interest rose considerably if the giver or receiver embarked upon a transaction on the eve of his departure from the country, for this meant running the risk of a casual loss. This type of transaction is given the name of *avak* in the ledger. Let us get some knowledge of this form of transaction by two illustrations:

> On 25th April 1684, Hovhannes borrows 50 rupees from Trikam, a middle-man, at 0·75 per cent interest a month. It turns out, however, that Hovhannes borrows this sum not for his own needs, but in order to lend it to Shambetsi Gaspar (at an interest of 27 per cent) who was leaving Surat for Isfahan. He writes the following on this occasion: 'On the 24th of the month of Shams I gave Shambetsi Gaspar 50 rupees of *avak*[1] at the interest of 27 per cent; the net profit came to 13·5 per cent. The sum lent together with the interest is 63·5 rupees; with 27 rupees making 1 *tuman*, the sum came to 2 *tumans* 3,500 *dians*. I enclosed the receipt in the letter I sent to my masters in Isfahan so that they should get the sum from him. I sent the letter through the medium of Topchents Markos.'

On other occasions Hovhannes becomes the borrower in Surat of a high-interest loan from the same Topchents Markos who was leaving for Isfahan and from Toomajan, son of Atom of Van, who was going to Basra. At least one of his entries on the subject is worth quoting:

> 'On the 21st of the month of Shams (Azaria Style) I borrowed an *avak* of 1,000 rupees from Markos, son of Topchents Poghos, in Bandar-Surat provided I should pay in Isfahan with an interest of 26 per cent. The *avak* borrowed was 260 rupees. The loan with its interest came to 1,260 rupees. I signed a liability at the rate of 27 rupees per *tuman* pledging that 105 days after I arrived on board the *Slemani* in Bandar-Abbas he got entitled to the sum of 46 *tumans* 6,660 *dians*, to be reimbursed by my masters in Isfahan.'

Of similar content is the entry concerning the *avak* borrowed from Toomajan of Van with the only difference that in the latter case the profit forms 20 per cent of the sum total and the payment is to be made by Hovhan of Shiraz, in Basra at the time (whom we have already met), who was in friendly relations with Hovhannes.

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[1] *Avak* is the name given to money borrowed from a resident of another country.

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## VIII

The controversies and disputes of the Armenian merchants from Nor Jougha were discussed and settled by the *Kalantar*[1] in Nor Jougha and the instance called the 'Assembly of Tradesmen'. 'The subject of dispute', writes H. Ter-Hovhaniants in this connection, should be presented to the assembly of tradesmen in written form, where after carefully weighing up the pros and cons of it, the resolution was to be written on the same application with the following words: 'The resolution of the assembly of tradesmen is as follows—our judgement of the case is the following—.'[2]

However, the Armenian merchant from Jougha used to spend most of the time away from his native country, wandering in the remotest corners of Europe and Asia in pursuit of private gains:

> 'The merchant of Nor Jougha wanders with zest
> In every nook and corner of East and West'

writes, on this occasion, Bagher-Oghli,[3] the favourite bard of the inhabitants of Nor Jougha.

Now what were the ways in which the disputes among the merchants of Nor Jougha were settled or their relations adjusted under foreign skies. These problems are also referred to in the ledger of our merchant.

When we bring all those facts together we arrive at the conclusion that in all cases the Armenian merchants preferred to make their attitude clear or settle their disputes on the instructions and advice of the *Joomiat*—the local Armenian community. If in a particular spot the number of Armenian merchants were small they invited foreign tradesmen to take part in the discussion of the controversial item (for instance, the Kashmirians in Lhasa). In exceptional cases alone, when all the above-mentioned ways of settling the dispute proved fruitless, did they apply to the local courts.

Let us turn now to those entries in the ledger that throw light on this set of problems.

We know already that on the eve of his departure from Tibet our Hovhannes gets a large amount of amber valued at 7,760 rupees. He ventures upon a responsible commitment when the obligation is undertaken before the *yuzur* of *Joomiat*, i.e. in the presence of the Armenian merchants of Agra.

We have already seen that Hovhannes takes two servants into his service on his way from Agra to Tibet. One of them, Ghalmash Petros, after discharging his duties for eight months, leaves the job in Lhasa. The contract envisages a salary of 40 rupees a year; therefore he was to get 25·5 rupees for eight months of service. A few days after the payment Hovhannes makes the following entry in the ledger: 'When servant Petros left my service I paid him his due in full. Considering the matter, the assembly of tradesmen and the Kashmirians adopted a resolution according to which I was to recover the sum for hiring a horse from Kuti to Ziguicha. Thus I recovered 3 *lanks* 10 *shahis*.' There is no doubt that the question

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[1] *Kalantar* is the bailiff of the Armenian community.

[2] *The History of Nor Jougha a suburb of Isfahan*, Vol. I, p. 183. The author also notes that many applications of merchants with resolutions of the assembly of tradesmen written on them are kept in the archive of the monastery of Amenaperkich in Nor Jougha. The publication of those valuable documents would prove a great help to those studying Armenian commercial law; therefore it is to be hoped that scholars in Nor Jougha would spare no efforts to fulfil this gratifying labour.

[3] *Ibid.*, p. 160. Also H. Sahakian, *The Armenian Bards*, Yerevan, 1961, p. 117.

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of the salary of Ghalmash Petros came before the assembly of *Joomiat* and *Kechmercots* on the initiative of Hovhannes himself, and the servant was made to return 40 per cent—10 out of the 25 rupees—he had earned by strenuous labour during the eight months.[1] By the end of April 1690 heated discussions flare up in Lhasa between Tsatoor, son of the pilgrim, Ghoukas, and our Hovhannes on two different matters. There are still dark points and undeciphered particular words in the entries concerning those controversies, yet the contents of the record are generally clear.

One of the reasons for the clash is as follows: some government instance passes a *kata* (resolution), one for Tsatoor and another for Nikoghos and a third for Hovhannes, whereby the data concerning the goods bought by the three merchants and their prices were apparently certified. In the resolution of Nikoghos instead of 128 *lanks* 8 *miskalis* as the cost price of tea, 228 *lanks* 8 *miskalis* were written, that is 100 *lanks* more (3 kg. 779 g. of silver). Tsatoor protests for the mistake laying the blame on Hovhannes.

The next reason occasioning the clash is simpler. As early as on 22nd December 1686, Hovhannes had given silver to Melijan 'to be recovered in gold after a year'. Under the agreement Melijan was to send gold in several settlements to Hovhannes from the Chinese city of Sini (Slink). In connection with the 11 *lanks* of gold (415·69 g.) received from Melijan on 17th April 1688, a quarrel flares up between Tsatoor and Hovhannes. Tsatoor maintains that 9 out of the 11 *lanks* of gold are his. The arguing sides apply to the Jong[2] that orders to reveal the truth by casting dice: 'An order was delivered by the Jong to cast dice.' Hovhannes dices away and the question is settled in favour of Tsatoor.

The scholar who makes a study of the court in Tibet and the mediaeval legal status of this people will find interesting the large section in the ledger elucidating those problems. The last paragraph of this section reads thus: 'On the 8th of the month of Adam, this Satan (i.e. Tsatoor) got deluded by the devil, put an amulet in his bosom and, bewitched by some lama, cast the dice and won the lot.'

Hovhannes admits not only his defeat but also pays the fines imposed on him by the court.

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[1] The author of the ledger has failed to be fair to his other servant (Poghos) either. After serving for 21 months in Agra he, too, comes out of his service and gets his due. But Poghos had also left his own money with Hovhannes (12 rupees). The latter had bought goods in Patna in his behalf. Now, Hovhannes gives back to his former servant not the goods (that might be sold in Lhasa with a profit of 100 per cent) bought with the money of Poghos but only the sum (12 rupees) which he had received from Poghos in Agra.

[2] In Lhasa Hovhannes has also a row with Melijan, son of Poghos. Our merchant had consented to his debt to Melijan being paid off partly in goods and partly in ready money. However, wishing to clear off his debt in goods alone, Melijan brings an action against Hovhannes. The latter comments this in the ledger as follows: 'He (Melijan) did not agree and applied to the *dev*', and goes on, 'the *dev* resolved to recover the debt half in ready money and half in goods.' Thus in the case of Tsatoor a certain Jong assumes the role of a judge while in the latter case the *dev*. To our knowledge the Dalai Lama, embodying the religious and temporal authorities of Tibet, is to be identified in both names. It is established that the supreme authority of the great Lama was phrased in colloquial speech as Deva Jong and it is precisely the constituent elements of this name—Deva and Jong—that have found room in the ledger in the transcription *dev* and *jong*. For Deva Jong and the ecclesiastical and temporal officials of Tibet, *see* B. A. Graham Sandberg, *Handbook of Colloquial Tibetan* and *A Practical Guide to the Language of Central Tibet*, Calcutta, 1894, pp. 188–92.

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## IX

The ledger of Hovhannes, son of the priest David, would be of lesser value if the terms expressing the units of coins, weights and measures in use in those days and countries were not provided with equivalents of the metric system.

Fortunately, reliable data are to be found in the commercial diary under consideration as well as in the *Manual for Trade* by K. Joughayetsi and *A Useful Book on Measures, Weights, Figures and Monetary Units* compiled by GH. Vanandetsi, based on the same manual.[1] They enable us to ascertain the metric equivalents of some scores of money and measure units in use in Iran, India, Nepal and Tibet by the end of the seventeenth century. Thus the ledger turns into a reference source on numismatics and metrology.

The basic monetary unit in Iran during the business activities of Hovhannes was the *Abbasi* (which under Shah Abbas I was minted in coins of 8·5 g. each). According to data mentioned in the above-given work of GH. Vanandetsi, an *Abbasi* contains 9·5 *danks*, i.e. 7·48 grams of silver. Therefore the smallest monetary unit of Sefian Iran the *dian* was 1/200th part of the *Abbasi*, weighing 0·037 grams of silver, while the *tuman* (1 *tuman* = 50 *Abbasis* = 1,000 *dians*) was the equivalent of 373·9 grams of silver. At the close of the seventeenth century the rate of exchange of the Iranian coin undergoes a gradual devaluation when coins minted with metals of lower standard were put into circulation in large numbers. Referring to E. Pakhomov's data, the standard of *Abbasi* ranged, at the close of the century, between 7·30 and 7·40 g., but there must have been *Abbasis*, *Mahmudis* and other coins of lower denomination. The data treating of this topic in the ledger seem to be of interest. He writes that on his way to India the chief of the port in Bandar-Abbasi would not take from him the sum amounting to 5 *tumans* 5,000 *dians* which comprised *Abbasis* and *Mahmudis* (2 *Mahmudis* = 1 *Abbasi*): 'The money I brought from Shiraz comprised 5 *tumans* 5,000 *dians*, *Abbasis* and *Mahmudis*. The chief of the port would not take the money. I gave the sum incurring a loss of 600 *dians* per *tuman*. Thus my loss totalled 3,300 *dians*.' It can be deduced therefrom that the *Abbasis* he possessed did not exceed 7 grams.

The devaluation of Iranian coins is also attested by data on the ratio of *Shahijani*-rupee (containing 11·33 grams of silver) and *tuman* or *dian*. Accordingly 27 *Shahijanis* equal 1 *tuman* or 1 *Shahijani* is the equivalent of 370 *dians*. Evidently, one can infer from those facts the *tuman* was in those days the equivalent of 306·4 grams of silver and the *dian* was correspondingly 0·03 grams of silver.

Hovhannes speaks of his business transactions on the Indian frontiers in terms of a money unit called *Shahijani* which was, in fact, the rupee minted by Shah-Jahan (1627–58). On several occasions he writes simply 'rupee' for *Shahijahani*. The weight of the rupee is to be found in K. Joughayetsi's *Manual for Trade*: 'One rupee contains 2·5 *miskalis* minus half a *massa*, while half a *massa* comes to 2·5 *ghirets*.'[2]

*Miskali* was the equivalent of 4·724 g.; *ghiret* 0·196 g. Accordingly 1 rupee = $(2{\cdot}5\times4{\cdot}724)-(2{\cdot}5\times0{\cdot}196) = 11{\cdot}81-0{\cdot}49 = 11{\cdot}32$ grams of silver.

The ledger contains several scores of various accounts that bear out the data of the *Manual for Trade* relating to the weight in silver of one rupee, with a negligible addendum of 0·01 g. Thus it can be certainly

[1] Published in Amsterdam in 1699.
[2] Matenadaran, MS. No. 5994, p. 12*b*.

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stated that in the years when Hovhannes was having his dealings, the equivalent of the Indian monetary unit, the rupee-*Shahijahani*, was 11·33 g. of silver.

In addition to the *Shahijahani* rupee there were others in circulation: *bazari shahi*, *Ovrankshahi*, *chalni* and *ilai*. The data in the ledger also throw light on the silver weight of the various rupees.

The current basic monetary unit in Nepal was called small *melli*. Hovhannes writes: 'Raja's monetary unit of the locality (i.e. Kathmandu) is the small *melli* which amounts to half a rupee.' The ledger contains many indications that confirm the 2 : 1 ratio of the small *melli* and the rupee.

There was also a copper coin, called *dam*, in circulation in Nepal. According to Hovhannes '119 *dams* make one small *melli*'.

Tibet had no currency. Trade was carried on either by exchange of commodities or in ingots of silver and gold. Data on barter, that are numerous in the ledger, are characteristic of the low economic standard in Tibet. The goods Hovhannes offered in exchange were mostly precious stones (amber, seed-pearls, etc.). He got in return musk, thread and textiles.

The basic weight unit of silver and other goods was here the *lank*, the weight of which can again be established in terms of the metric system if we turn to the foregoing reference sources where the data are recurrent and complementary.[1] Accordingly, *lank* or *tank* equals 37·79 g.

As huckstering in Tibet was carried out in the main in ingots of silver, the standard of the metal was of great significance, and often silver of low standard was in circulation. The merchant should be on the alert not to be cheated in ingot silver of low standard. And our experienced merchant was not in all cases up to the mark; he sustained losses especially when he had dealings with state bodies. We have already mentioned that upon melting, of the 430 *lanks* of silver Hovhannes had received from the customs-house in Lhasa, 62 *lanks* were lost.

The state bodies forced the people to take debased metal, but when receiving they exacted silver of the highest standard. Hovhannes' friend Nikoghos should pay 7 *lanks* 2 *miskalis*, the fee of hiring four pack animals, to a government establishment called *sarkar* (this was probably the name given to an institution in Tibet engaged in commercial activities). It was Hovhannes who pays off the debt and writes in this connection: 'I gave them high-standard silver; they made it red-hot three times and melted it twice; 6 *miskalis* were lost.'

Another entry of this kind by Hovhannes is also worthy of mention, according to which the officials of the same *sarkar* in Lhasa 'give the silver less but require more'. He speaks of this in greater detail in another chapter of the ledger: 'Since two types of weights are used in the *sarkar*; when receiving the heavier weights are placed on the scales, when giving the lighter ones.'[2]

Concerned over the fate of the low-standard silver in hand, the merchants often tempered it with silver of higher standard or raised the value by melting and purifying. Hovhannes remarks on one occasion: 'The

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[1] Cf. The Mashtots Matenadaran, MS. No. 5994, p. 15*a*; cf. *A Useful Book on Measures, Weights, Figures and Monetary Units* by GH. Vanandetsi, Amsterdam, 1699, p. 17.

[2] Similar counterfeiting was also done by the British officials of the Eastern India Company, residing in Calcutta. In one of his last entries Hovhannes reports: 'I sold all the *soopons* I had to the English by the market weights which, I was told, came to 12 *sers*, but they must be more.'

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silver was debased. I gave better quality silver to Nikoghos for tempering.' On another occasion he notes that the 20 *lanks* of silver 'tarnished. I melted and one *lank* was reduced; 19 *lanks* were left'.

The sale and purchase of gold was effected in Tibet and its neighbouring countries by such units of weight as *sookam* and *seva* and *massa* as well as *goormoo*. If we come to compare the prominent facts of our merchant with relevant data in other sources of reference, the metric equivalents of the mentioned weights also become evident.[1]

The gold casts were brought to Lhasa largely from the Chinese city of Sinin (Slink). As to standard the casts were of three types: *pana* or *varagh*, *khamser* and *joonser*. The standard of the gold used is always indicated in the ledger: 'The gold of Matos that has come to me in the form of *pana*, *khamser*, *joonser* are all noted down separately; the total sum comes to 874 *sookams* 0·5 *seva*.'

*Pana* gold weighs 167 *sookams* 14 *sevas*;
*Khamser* gold weighs 520 *sookams* 16·5 *sevas*;
*Joonser* gold weighs 185 *sookams* 10 *sevas*.

*Pana* was the highest standard of gold and *joonser* the lowest. *Khamser* was the middle and the most numerous.

We are unable to determine the rate of pure gold in those casts yet the data available make it possible to give a rough estimate of their price levels. In this respect one among a number of entries is of particular interest. Hovhannes enters the weights of the gold casts of the late Matos taking down at the same time the cost price of each of them in rupees per unit (in *tola*, in the given case).

Accordingly,

One *tola* of *pana* is 12·75 rupees;
One *tola* of *khamser* gold is 12·05 rupees;
One *tola* of *joonser* gold is 11·55 rupees.

Thus, if we take provisionally one unit of high-standard *pana* gold for 100, the proportional value of *khamser* and *joonser* will be respectively 94·5 and 90·5, according to the given data.

In order to bring forth the economic and historical value of the hundreds of entries in the ledger concerning the sale and purchase of various goods, it is also essential to identify the metric equivalents of the remaining measures.

For this we have again to resort to K. Joughayetsi's *Manual for Trade*: 'When one buys indigo in Khoorji, Hndvi and elsewhere, the bargain is effected by a litre called *akpar* which equals 40 *sers*; one *ser* = 30 *pesabars*; one *pesa* = 4·5 *miskalis*; one *akpar* litre is thus 5,400 *miskalis*.'[2]

Relying on these data the metric equivalents of the measure units in Hovhannes' ledger become readily discernible.

Thus

*Miskali* (*ajamstana*) = 4·724 g.
*Pesabar* = 21·258 g.
*Ser* = 637·74 g.
*Akpari* litre = 25 kg. 509 g.

The litre called *ajamstana* or *shahi* in Sefian Iran has also been in common use (weighing 5 kg. 888 g. and called also *man*). Other measure

[1] *See* the list of coin and measure units on page 181 in alphabetical order.
[2] The Mashtots Matenadaran, MS. No. 5994, p. 13*a*; cf. *A Useful Book on Measures, Weights, Figures and Monetary Units* by GH. Vanandetsi, Amsterdam 1699, p. 16.

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units have likewise been used particularly for precious stones (*darni, dolna, erati, tan, manchan, tank*, etc.) the weight of most of which can also be specified through comparative data in our ledger and other sources.

Without going into details, we quote below the list of monetary and measure units used by Hovhannes in his ledger, marking against each unit the metrical equivalent which is checked by numerous cross-references and is, for the most part, reliable and authentic:

1. *Bazari shahi*—a rupee below the mark; 10·54 g. of silver.
2. *Chaku*—the weight uncertain.
3. *Chalni*—a rupee below the mark; 11·10–11·16 g. of silver.
4. *Dam*—small copper coin (119 *dams* make one small *melli*).
5. *Darni*—1/24th part of *chaku* of uncertain weight.
6. *Dian*—a small unit of the Iranian monetary system, the equivalent of 0·037 g. of silver.
7. *Erati*—1/96th part of *tola*; 1/8th part of *massa*; 0·18 g. in weight.
8. *Erati* (in Patna)—0·15 g. in weight.
9. *Foon*—1/10th part of *gaturi miskali*; weighing 0·37 g.
10. *Ghitr* (*litre*) *ajamstana* or *shahi*—weighing 5 kg.
11. *Ghitr* (*litre*) *akpari*—weighing 25 kg. 509 g.
12. *Ghitr* (*litre*) *Tehrani*—weighing 2 kg. 944 g.
13. *Ilayi*—a rupee below the mark; 10·92–10·85 g. of silver.
14. *Kakas*—weighing 1·26 g.
15. *Kal*—1/12th part of *sookam*; weighing 0·42 g.
16. *Kanua*—1/16th of *pakaser*; weighing 53·14 g.
17. *Lank*—weighing 37·79 g.
18. *Litre*—(see *ghitr*).
19. *Mahmudi*—half an *Abbasi*.
20. *Manchan*—weighing 0·29 g.
21. *Marchil lakri*—European gold coin, the equivalent of 24·93 g. of silver.
22. *Marchil flori*—European gold coin, the equivalent of 24·60 g. of silver.
23. *Massa*—1/12th part of *tola*; weighing 1·01 g.
24. *Massa nepali*—weighing 1·21 g.
25. *Miskali ajamstana*—weighing 4·72 g.
26. *Miskali gatoori*—weighing 3·78 g.
27. *Negha*—weighing 2·51 g.
28. *Ovrankshahi*—a rupee below the mark; 11·12 g. of silver.
29. *Pakaser*—weighing 850·32 g.
30. *Pesabar*—weighing 21·26 g.
31. *Rupee*—the silver coin of India; 11·33 g. of silver.
32. *Ser*—1/40th part of *akpari ghitr*; weighing 637·74 g.
33. *Seva*—1/20th part of *sookam*; weighing 0·25 g.
34. *Shahinshahi*—the same as rupee.
35. *Small melli*—the silver coin of Nepal, half the cost of the Indian rupee (5·66 g. of silver).
36. *Sookam*—weighing 5·06 g.
37. *Tan*—0·18 g. in weight.
38. *Tank*—(see *Lank*).
39. *Tank*—weighing 16·21 g.
40. *Tola*—weighing 12·15 g.
41. *Tola nepali*—weighing 14·56 g.
42. *Tuman*—the large unit of Iranian monetary system, containing 10,000 *dians* or 50 *Abbasis*.

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## X

Now let us dwell on the measures of length.

In order to understand and properly appreciate the first entry of Hovhannes Joughayetsi, one must find out the equivalent in the metric system of the length of measure called *gaz*. In this entry the merchant says: 'I have got 18 pieces of red and green narrow broadcloth; in all 726 *gazes* 6 *grehs*.'

Until now various lengths of measure called *gaz* (from 63·5 cm. to 112 cm.)[1] are in use in different parts of Iran. It is certain that many varieties of *gazes* were made use of in mediaeval Iran. Fortunately, we know from another entry in Hovhannes' ledger that the broadcloth he would take to India was measured by a length called *shahi gaz*. That *gaz*, which was also used half a century before that in Iran, was 101·6 cm. as a unit measuring the length of woollen cloth.[2] This evidence from recent sources is upheld by the important statements of Kostand Joughayetsi and Ghoukas Vanandetsi. The first of these says: '100 *shahi gazes* = 150 Aleppo *gazes*'; the second puts it in a similar way: 'one *shahi gaz* = 1·5 Aleppo *gazes*.'

The length of the Aleppo *gaz* is, according to F. I. Guter, 67·733 cm.,[3] therefore one and a half *gazes* of Aleppo come to 101·6 cm. (1·5 × 67·733 = 101·6 cm.).

The English broadcloth Hovhannes takes from Isfahan to India is sold by *Shahijahani* or *lashkari gaz* that differs from the one called *Shahi* or *Shahijahani*. The rates of those lengths are revealed in one of the entries which reads as follows: 'The broadcloth I have brought from Isfahan turned out 726 *gazes* 6 *grehs*. The broadcloth sold twice in India comes to 774·25 *gazes*; 47 *gazes* 14 *grehs* or six per cent more than the previous measurement.'

Now, if 100 *shahi gazes* were equal to 106 *Shahijahani* or *lashkari gazes*, then one *Shahijahani gaz* should equal to 95·85 cm. Thus,

The length of *shahi gaz* is 101·6 cm.;
The length of *Shahijahani* or *lashkari gaz* is 95·85 cm.;
The length of Aleppo *gaz* is 67·73 cm.;
Every *gaz* is made up of 16 *grehs*, every *greh* of two *pais*.

Apart from the established units of measure and weight in other fields of trade and economy such units of measure and weight were also used that were not permanent units. A number of terms were also in use that indicate that the sale of certain commodities was in pairs or otherwise. Hovhannes Joughayetsi has also made use of various similar terms.

In the entries treating of the sale and purchase of textiles, most of all we come across the term *tan*. Judging by some of the hints in the entries we can incontrovertibly state that *tan* is not a measure of length but a length of clothing. See, for instance, the excerpts quoted herewith: 'He had written ordering a suit of white woollen cloth; I have done it. He gave one *tan* of striped cloth to Hovhannes meant for a suit.'

But what particular measure fitted into the length of a suit? In a number of consecutive entries Hovhannes reports on such fabrics as *kuchi* and *makhmoor*; in one case 1 *tan* meant 15 *kaghams* (a measure of length)

[1] *See* Spravočnik mer. naučno-issledovatel'skiĭ institut ministerstva torgovli Soyuza SSR, Vneštorgizdat, Moskva, 1956.

[2] F. I. Guter, Cravnitel'nye tablitsy (izloženie monetnyx, merovyx i vesovyx sootnošeniĭ vsex stran sveta . . . ), pyatoe ispravlennoe i dopolnennoe izdanie, Riga-Laĭptsig, 1911, p. 27.

[3] *Ibid.*, p. 28.

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while in the others 17, 18, 19 and 20·5 *kaghams*. It is clear, therefore, that the length of the *tan* was related to the purpose of the cloth and perhaps its breadth and kind too. We believe, nevertheless, that *tan* was taken to mean the measure of a stuff 4·5–5 metres long. The following entry serves the basis for such assumption: 'On the 18th–20th of the month of Dama (Azaria Style) I bought 600 *gazes* of white-washed *gazi*. Of this, 4 *gazes* 14 *grehs*, i.e. 1 *tan*, I used for suit.'

The deal is arranged in India, so that the mentioned *gazi* must be that of *shahijan* (95·85 cm.): therefore one length for a kind of suit called *chain* comprised the length of just over 4·6 metres. There are also data indicating the length of the *tan* being five metres.

The sale of indigo, musk and tea is prominent in the dealings of Hovhannes.

A measure called *charm* has been used in trading in indigo. Now what was the capacity of that measure? The merchant himself states: 'One *charm* of the indigo we have bought in Khurja is the equivalent of four litres.' If the litre mentioned here is to be regarded as the *akpar* litre, the 92 *charms* of indigo Hovhannes buys jointly should be taken for about 10 tons which is somewhat incredible. Then he must have had his deal with the *ajamstana* litre that is the equivalent of 5·888 kg. Accordingly, he buys in all 2,166 kg. (5·888 × 4 × 92) of indigo of which 376 kg. (16 *charms*) were his own.

His bargains of tea and tobacco are entered in the ledger by the unit of measure called *baghcha* (bundle), the approximate weight of which becomes manifest through the following entry: 'I have bought 22 *baghchas* of tea, each bundle 12·5 *miskalis*; 10 bundles of various sorts of tea I have sold at 12 *miskalis* each.'

It follows that one *baghcha* can hold 12–12·5 *miskalis*, i.e. 45–47 g. of tea. The same result is arrived at when comparing other data on the sale and purchase of tea, elsewhere in the book.

As we know Hovhannes takes from Lhasa about 42·155 kg. of musk, bought by *nafas* (such was the name given to the aromatic navel of moschus or musk-deer). The numerous entries in the ledger indicate that the navel has weighed about 50–60 g.

Sacks of varying capacities have also been in use along with other units for commodities sold by the piece. Being unable to refer to all of them one by one, we quote herewith the alphabetical list of the measures of length and the related units of weight used in the ledger:

1. *Baghcha*—a small sack, holding 45–47 kg. of tea.
2. *Chot*—a cloth, wrapping.
3. *Charm*—a sack, holding about 23 kg. of indigo.
4. *Chokra*—eight pieces of commodities.
5. *Dzern*—a measure of length.
6. *Dolna*—a set.
7. *Gaz shahi*—101·5 cm.
8. *Gaz Shahijahani* or *lashkari*—95·85 cm.
9. *Gaz of Aleppo*—67·73 cm.
10. *Jor*—two pieces of commodities.
11. *Kagham*—a measure of length.
12. *Kal*—a sack; 20–24 *kals* make up one load.
13. *Khak*—bale (one bale could hold 124–62 *tans* of clothing).
14. *Kham*—a sack containing about 27·5 kg. of goods.
15. *Kissak*—a wallet.
16. *Koori*—twenty pieces of commodities.

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17. *Nafa*—the navel of the musk-deer used in weighing about 50–60 kg. of musk.
18. *Sandoogh*—a small box.
19. *Tan*—one length of clothing 4·5–5 metres long.
20. *Top*—a fabric for wrapping textiles (according to one entry a top comprised 14 metres of cloth).

## XI

The ledger of Hovhannes, son of the priest David, is also an inestimable source as far as the history of book-keeping and economy is concerned. It is beyond the scope of this subject and our abilities to give a description of the system of book-keeping Hovhannes has had recourse to. This topic is likely to be taken up by our economists in view of the fact that this mode of compiling the ledger endorsed by the Armenian merchants in Nor Jougha found, at a later date, wide application in many Armenian colonies. A great many Armenian merchants in Astrakhan, Moscow and numerous other areas compiled their commercial *roozlama* (diary) that way.

In order to give some notion of the form and way in which the ledger was framed we publish below a brief excerpt from it. With the aim of giving a clear picture of the contents we should like to dwell in brief also on the system of figures used by Hovhannes, which is unusual to us, yet well known in his days.

Our merchant is well versed in Arabic numerals and makes no error in their usage. Thus, for instance, he writes:

'I have spent in all 311 small *mellis*.' On the left-hand side of the line the small figure is noted down in Armenian letters գ ճլլ \≡ (the strokes mark the fraction).

The Arabic numerals are used particularly in those pages of the ledger where data relating to the sale and purchase done in Lhasa by *lank* and *miskali* are entered. The left margin of those recordings displays the sum of the *lank* in Armenian figures while the *miskali* account, that forms a decimal part of it, is given in Arabic figures.

However, the Arabic numerals are so infrequently used that they are almost unnoticed. Our merchant keeps his account referring largely to a variant of the system of letters of the Armenian alphabet (used to designate the years) which is very likely to have been compiled by Kostand Jougha-yetsi and taught to his pupils specializing in trade.

The system of figures commonly used in Armenian ancient and mediaeval manuscript writing is expressed in the table given below:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Digits* | Ա | Բ | Գ | Դ | Ե | Զ | Է | Ը | Թ |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| *Decimals* | ժ | Ի | Լ | Խ | Ծ | Կ | Հ | Ձ | Ղ |
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| *Centesimals* | Ճ | Մ | Յ | Ն | Շ | Ո | Չ | Պ | Ջ |
| | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
| *Millesimals* | Ր | Ց | Ւ | Տ | Ր | Ց | Ւ | փ | ք |
| | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 | 8,000 | 9,000 |

In the ledger the sets of digits and decimals are used invariably, yet the centesimals and millesimals are applied variously. Hovhannes never

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writes, say, Շ (500), Ջ (900), Ս (2,000) or Ք (9,000) but those numbers he invariably expresses as ԵՀ (5×100), ԹՀ (9×100), ԲՌ (2×1,000), ՋՌ (6×1,000). Accordingly the number 3,476 which might be expressed as ՎՆԼՋ, he always writes as Գ"ՌԴՀԼՋ. The millesimal figures are always marked on top by two slightly oblique strokes while the centesimals, decimals and digits have one horizontal line above them.

If in writing any four-, three-, or two-digit figure by the Arabic system a zero was to be inserted, Hovhannes uses a point which is common in the East. Thus,

Ա"Ռ · ԻԲ—1,022;

Ա"ՌԲՀ · Բ—1,202;

Ա"ՌԲՀԻ—1,220.

The marking of fractions is very interesting.

Our reader should have taken notice of the vertical and horizontal strokes that lie to the right of most figures quoted from the ledger. Thus, ԺԱ╲, ԻԲ╲=, ԼԵ╲=╲, and so on. These are the fractions which are deciphered in the table given below:

TABLE

| Signs of fractions | The equivalent of the sign in fractions | The equivalent of the sign in decimal fractions |
|---|---|---|
| ╲ | 1/4 | 0·25 |
| ╲╲ | 2/4 | 0·05 |
| ╲╲╲ | 3/4 | 0·75 |
| ·— 55 | 1/40 | 0·025 |
| ·= | 2/40 | 0·05 |
| ·≡ | 3/40 | 0·075 |
| ··\| | 1/400 | 0·0025 |
| ··\|\| [1] | 2/400 | 0·005 |
| ··\|\|\| | 3/400 | 0·0075 |

Thus the fraction ╲—╲, for example, designates 1/4+1/40+0·1/400, i.e. 141/400 or 0·3525. The fraction ╲╲=╲╲ means 2/4+2/40+2/400, i.e. 282/400 or 0·73, and so forth.

The years and months in the ledger are almost invariably marked according to the calendar of Azaria Joughayetsi which Hovhannes terms as 'small figure of Azaria', or simply 'small figure'.

The first year of this calendar, compiled in Jougha and widely applied for over two centuries in Iran, India and other communities of Armenians from Jougha, begins on 21st March 1615, Old Style (2nd April, New Style) and ends on 20th March 1616 (1st April, New Style). The year, after the Old Armenian Style, is divided into 13 months, 12 of which have 30 days each, while the last month is made up of five days (or six in leap years).

[1] The left-hand side point is inserted when the decimal or centesimal of the fraction is missing or in the absence of both.



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The months are Shams, Adam, Shkat, Nakha, Ghamar, Nadar, Tira, Dama, Hamira, Aram, Ovdan, Nirhan and Avelyats.

## XII

The present paper is but a study of the Ledger of Hovhannes, son of the priest David. This outstanding source will prove a treasure of valuable information to those who will turn to it in future in their efforts to investigate the history of the capital of Armenian Khojas in Iran, India, Nepal, Tibet and especially in Jougha.

To make the contents of the Ledger of full scientific value there still lie ahead difficulties to be surmounted, in the sense of deciphering illegible parts and elucidating the meaning of dialectal and Persian terms, and also words in other languages, which our merchant has used.

This not at all easy task will be tackled with the active co-operation, as we have already mentioned, of the Iranist H. Papazian. In the meantime we believe that the information we have provided on the composition, the author's style and the language of the Ledger, as well as the contents, will prove helpful, not only for the history of trade among Armenian merchants, but also for Iran, and particularly for India, Nepal and Tibet, during the closing decades of the seventeenth century.



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# REVIEWS OF BOOKS

A BIBLIOGRAPHY OF INDOLOGY. Vol. III. Bengali Language and Literature, Part I (early period). Compiled by S. C. Das Gupta, formerly Professor of Bengali, Presidency College, Calcutta. Published by the Librarian, National Library, Calcutta.

The present volume of the *Bibliography* is intended, as the sub-title indicates, to record the work done in connection with Bengali Language and Literature in the early period, a period which is supposed to come to an end with the close of the fifteenth or beginning of the sixteenth century, or be equivalent to the pre-Caitanya period. But, as a matter of fact, it does not confine itself strictly within the limits of language and literature. It has sections on History-cum-Culture, Inscriptions and *Vṛtas* which have a very remote connection with the main subject of the work. Quite a number of entries again deal with matters scarcely belonging to the period under review. Stray, incidental references to topics of literary linguistic or cultural interest have occasionally been considered sufficient to merit an entry. Entries on the same topic are often found scattered in different places without any cross-references. Entries on the *Pavanadūta* (156), *Kūṭṭanīmata* (521), Hindu Rituals (286), Mallasarul Copperplates (480, 849, 494, 496), *Āryāsaptaśatī* (1575), Nārāyaṇa Deva (1146–48, 1153–58, 1160–66, 1175–76) and *Padakalpataru* (1572–73, 1593) may be cited as instances. The same proper names are sometimes found to have been used in different places with different diacritical marks.

CHINTAHARAN CHAKRAVARTI

THE CHANGEABLE AND THE UNCHANGEABLE IN RELIGION. By Dr. Jwala Prasad Singhal. Published by Vishva Bandhu Research Institute, Hoshiarpur, in 1965. Pp. 225.

In this book the author sets himself the task of finding out what are the essential elements of religion. As a preliminary step to this inquiry, by way of preparing the ground for it, he also tackles the question whether there is any rational basis for belief in God. He thus deals with two separate problems of the philosophy of religion which are closely linked together.

As regards the question of a rational basis for the concept of God he refers to the hostile attitude of anthropologists, psycho-analytic thinkers and communists. He also draws our attention to the irrational attitude of some religious thinkers who take shelter under intuition which is eulogized as super-logic and as the only competent method which can throw light on religion on the plea that it belongs to the domain of mystery and is, therefore, beyond the grasp of the intellectual process. The author rightly denounces such attitude as he feels that theology should discard artificial protection and come out in the open (Chapter IV, p. 48). He, therefore, proposes to build his theory on the world of experience.

He then refers to Jung's view that there are two types of thinking, namely phantasy thinking and directed thinking. The latter evidently is identical with the logical method adopted in science and philosophy. He proposes to adopt this second method so that his findings may be acceptable to rationalist thinkers.



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He then refers to Jung's theory about the genesis of the concept of God, which traces its origin to mystic experience which results from regressive pleasure-thinking and is auto-suggestive in character. According to Jung, therefore, the concept of God stems from the Father-imago. This proposition is not acceptable to the author. According to him the impulse to conceive the idea of God is received from social life. God is not necessarily imagined as Father but also as Ruler, Director, etc. (Chapter VI).

After thus clearing the ground the author builds up his theory on the origin of the concept of God. According to him it stems from the nature of man himself. His intellectual, emotional and physiological needs find fulfilment in such a concept (Chapter VIII). His intellect needs a principle which can give a satisfactory explanation of cosmology. On the other hand, science cannot give a complete cosmology. Then there is the pragmatic need for such a concept to derive solace and comfort in distress. Similarly, he needs such a concept to function as a centre round which his higher emotions like devotion and respect can play.

For satisfaction of man's intellectual need the author thinks that the cosmogony as outlined in the *Nasadiya Sūkta* is most suitable. Its principal feature is that it traces the birth of the universe from a primordial entity which is neither matter nor mind but contains the seed of both and is a self-propelling principle as the expression *Svadha* would suggest. It may be mentioned here that it is germinal idea contained in this Sūkta which in later Upanishads matured into a pantheistic conception on the universe. The author prefers such a concept as it is neither idealistic nor materialistic and cannot be assailed by the discoveries of science.

Evidently he has preference for a pantheistic conception of God as against the theistic conception. He, however, appreciates its limitation and also realizes that, in such a conception, God will be an impersonal principle and would be incapable of responding to prayers. Nevertheless, he believes that it will be biologically and psychologically satisfactory and, additionally, will have the merit of being rooted in reality, thereby needing no protection under the umbrage of mysticism (Chapter XI) or intuition.

After this the author takes up the other question, namely what are the abiding elements of religion. According to him, the three permanent elements of religion are: (1) the intellectual, (2) the emotional and (3) the moral elements. He, however, concedes that the idea of God and cosmology may be variable elements to suit the intellectual and emotional needs of different men; but he is very firm on the point that the ethical element should be invariable, because it is a social matter and concerns the society more than the individual (Chapter XVIII). It should be, therefore, true both philosophically and socially. He also says that it can be theologically true as well because the theological God possesses all the qualities of perfection.

It appears that the main deductions of the author are logically sound. It is commendable that in treating the subject he has taken up a purely rational attitude which is a difficult feat indeed considering the fact that it is inextricably mixed up with emotion. He has not, however, been able to shake off altogether ideas which are more rooted in faith than reason. He thus proposes to retain a place for mysticism as a corrective to reason. He also appears to subscribe to the view that the soul can maintain a separate existence from the body and, therefore, transmigrate (Chapter XII). It is also felt that the treatment leaves room for improvement. It is not unoften repetitive and brings in matter which is not very directly connected with the point under treatment. The elaborate survey of moral theories over several chapters may be referred to as an instance.

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On the whole, after going through the book under review one is left with the impression that it is a commendable effort on a difficult subject. The reading of the book will be no doubt a rewarding experience.

HIRANMAY BANERJI

SĀṂKHYADARŚANA. By Bhupendra Nath Bhattacharyya, Lecturer, Sanskrit College, Calcutta. Published by Sanskrit College, Calcutta. Royal octavo, pp. 353.

The Sāṁkhya system of Kapila represents one of the six schools of philosophy which follow the orthodox line. It is unique in two ways. At the first instance, it propounds a system which seeks to explain reality by accepting two detached entities, namely *Prakriti* on one side and *Puruṣa* on the other, where the second is altogether passive and the first, in a state of unbalance, transforms itself into both the subjective and the objective elements of reality. Secondly, it has continued to exercise profound influence over the later Indian thought including the *Mahābhārata*, the *Purāṇas* and even some of the *Upanishads*.

Unfortunately, there was so long no book in Bengali which has attempted a comprehensive treatment of this important school of philosophy. The present book appears to have removed this gap. The author has taken great pains at making his study as exhaustive as possible dealing with all the essential aspects of this system. In doing so, he has made full use of all available materials on the subject including the works of exponents like Īswara Krishṇa, Vijñānabhikshu, Vāchaspati Miśra. He has also made full use of a manuscript entitled *Yuktidīpikā* which was found out only about 30 years ago. The treatment is methodical which makes the book easy to follow. It thus fulfils all the requirements of an exposition in Bengali of the Sāṁkhya system of philosophy. It is a commendable effort for which both the author and publishers deserve the thanks of serious students of Indian philosophy.

HIRANMAY BANERJI

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(1) *Sir Alexander Cunningham and the Beginnings of Indian Archaeology* by Abu Imam

(2) *Muhammad Shahidulah Felicitation Volume* by M. Enamul Haq

(3) *Man in the Universe* by W. Norman Brown

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